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ELEMENTARY AND MIDDLE SCHOOL SCIENCE IMPROVEMENT PROJECT

NAS8-36277

Final Report Covering the Period

May 1986 - December 1988

Submitted by:

Saundra Y. McGuire Department of Chemistry Alabama A & M University Normal, Alabama 35762

Pepared for George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812

(NASA-CR-183768) ELEMENTARY AND MIDDLE SCHOOL SCIENCE IMPROVEMENT PROJECT Final Report, May 1986 - Dec. 1988 (Alabama A & M CSCL 05I Univ.) 124 p

N90-14125

Unclas /80 0204492

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The Alabama A & M Science Improvement Project: Getting Minority Students Involved in Science

Introduction

The Alabama A & M University Elementary and Middle School Science Improvement Project (Project SIP) was designed to improve elementary and middle school science in North Alabama by involving teachers in a two-week summer workshop as well as other follow-up activities. The purpose of the activities was to increase the science knowledge of the teachers and to provide them with materials and activities for hands-on science lessons. The summer workshops, conducted during the summers of 1986, 1987, and 1988, provided instruction and materials for activities in the areas of biology, chemistry, physics, and electricity and magnetism. The materials included equipment whose total value was over \$400.00. Additionally, a manual containing 43 lessons which included background information, experiments and activities for classroom and home use was provided to each teacher. During the course of the project activities, the teachers interacted with fourteen scientists from Alabama A & M University, eight staff members from the NASA Marshall Space Flight Center, three staff members from the University of Alabama at Huntsville Johnson Environmental Education Center, two teachers who served as presenters, and one NASA Teacher in Space Finalist, Kathleen Beres. the Project was initially planned for two years, residual funds allowed a third workshop to be conducted during the summer of 1988. This report will thus detail activities during the period May 1986 - August 1988.

Teacher/Counselor/Administrator Training Project Summary

I. Administrative

A. Participant Recruitment and Selection

Project SIP sought teacher participants from elementary and middle school grades (targeting grades 3 - 8) for participation in the program. These grades were targeted because the science material content of the program was most congruent with material appearing in the science curriculum of those grades. However, applicants from other grades within the schools were not eliminated in the selection process because of the changes in grade assignments that often occur in the school system. (For example, a teacher may teach kindergarten one year and fourth grade the next.) Also, high school teachers who expressed a strong interest in the program were not eliminated because much of the content is applicable to high school physical sciences courses as well as elementary and middle school.

The number of workshop participants selected and agreeing to participate was thirty in 1986, twenty-four in 1987, and fourteen in 1988. (The 1988 workshop was designed for approximately 15 - 20 participants due to limited funds.) Of the sixty-eight total participants, forty-five were elementary

teachers, twenty were middle-school teachers, and three were high school teachers. Three of the teachers were Special Education teachers -- two for gifted education, and one for slow learners. All were currently teaching or planning to teach in North Alabama.

A number of different mechanisms were used to attract teachers. Notification of the workshop was sent to all inservice-education coordinators. all principals, and selected elementary and middle school teachers throughout the four county, ten school-district region served by the project. (The selected teachers were those who had previously participated in a workshop sponsored by the Alabama A & M -UAH Regional Inservice Education Center. In addition, an article about the workshop appeared in the local newspapers soliciting participants. One of the most effective recruiting techniques was the publicity provided by former participants in workshops coordinated by the Project Director. Teachers told other teachers in their schools about the workshop and encouraged them to attend. Finally, the Project Director contacted some teachers directly who had expressed an interest in and a need for participating in a science workshop. The least effective mechanism seemed to be the communications sent to principals and system inservice coordinators. was a delay in getting the information to the teachers, and some participants reported that their principal provided the information only to those teachers that he or she personally wanted to participate in workshop activities. Thus, the majority of teachers at the school would not be aware of the workshop activities. The newspaper article and the direct contact with teachers were the most effective recruitment mechanisms.

Based on experience with this project, the preferred strategy for recruiting participants is to contact teachers directly via presentations at local inservice activities and direct mail contact. However, one problem with the selection of participants was that teachers would indicate that they were definitely coming to the workshop, but then not show up when the workshop actually started. It was necessary to write to teachers asking them to please let us know if they were not going to be able to participate so that others could use their spaces. This effort was marginally successful, but during the second and third workshop sessions, attendance was affected by the cancelling out at the last minute of several of the planned participants. It is nearly impossible for other teachers (from an alternates list, for example) to attend a two week workshop on very short notice. Those contacted either had problems arranging for child care or had made other plans for at least part of the two week period.

B. Scheduling

A workshop that provides teachers with instruction in the areas of biology, physics, chemistry, and electricity and magnetism, as well as allowing them to individually participate in a variety of hands-on activities requires approximately 35 - 40 hours of on-site instruction to teachers. A two-week block of time with four hours of instruction each day was used with Project SIP because teachers had indicated that a one week block with eight hours of instruction per day forced them to cram too much information, and that

committing more than two weeks of time to such a project was unfeasible for teachers who have only two months away from regular classroom duties. One common problem experienced by workshops that are longer than two to three days in length is absenteeism. However, the Project SIP participants were informed that they were expected to participate each day unless emergencies arose that made it impossible to attend. Most participants attended all ten days of the workshop.

Since the workshop assumed no prior existing science knowledge, the sequencing of workshop activities was designed to start teachers off with the familiar--biology. Physics was offered next to show them how exciting physics can be while the interest level in workshop activities was still at a peak, and their fear of physics would not overly dampen their enthusiasm. The electricity and magnetism activities were presented after they had been exposed to some physics. Finally, they were dazzled by the chemistry experiments that involved everyday materials readily available to them and their students. This sequence worked very well.

Since the project was designed to use readily available, low-cost materials, most of the materials were available and ordered in time to be provided to the participants when appropriate. Packaging the materials in the form to be given to the teachers was the most logistically taxing part of the project, but was successfully accomplished by using assistants from the Department of Chemistry at Alabama A & M University. The set of materials for each of the four units was boxed in a different "kit" and distributed to the teachers at the beginning of the appropriate unit. Thus, at the conclusion of the workshop the teachers had four sturdy boxes--each containing materials with which to do activities in biology, chemistry, physics, or electricity and magnetism. A list of the items in each kit is provided in the appendix. Additionally, teachers were provided with a list of everyday items that can be used to teach science concepts. This list also appears in the appendix.

C. Facilities

The workshop activities were held in one of the biology laboratories of Carter Hall, the science building at Alabama A & M University. The size of the room was quite adequate as were the facilities--running water, gas and electrical outlets, and a projection screen. However, the participants in the first workshop complained (justifiably) that the temperature of the room was uncomfortably warm and the air-conditioner extremely loud. In subsequent summers this problem was corrected.

The workshop accessibility to participants was excellent. There were no residential provisions made as all participants resided within commuting distance of the workshop activities. Transportation was provided by the participants themselves. No per diem or mileage allowance was provided since the participants were getting the workshop instruction and materials free of charge. The only incentive for attending the workshop was the \$400.00 worth

of materials that teachers knew they would be receiving throughout the course of the two weeks.

The cooperation between members of the departments of chemistry, biology, physics, and electrical engineering technology at Alabama A & M, as well as representatives from the NASA Marshall Space Flight Center and the Johnson Environmental Center at the University of Alabama at Huntsville was crucial to the success of the project. The presence of so many scientists on campus and making presentations to participating teachers was a great advantage for the program. Additionally, the teachers were provided with resource persons whom they called upon during the school year to speak to their classes.

D. Program Staff and Administrators

The project was administered solely by the Project Director. Secretarial assistance was provided by the Department of Chemistry and the Alabama A & M -UAH Regional Inservice Education Center. The teaching staff of the Program was recruited from the science departments of Alabama A & M University, the NASA Marshall Space Flight Center, and the University of Alabama, Huntsville Johnson Environmental Center. The members of the teaching staff were from a variety of disciplines, in keeping with the nature of the workshop. A total of twenty-seven scientists and/or administrators worked with the teachers. Sixteen of these were from Alabama A & M, eight from the Marshall Space Flight Center, and three from the UAH Johnson Environmental Education Center.

The training for the teaching staff included an orientation session on the nature of the program and the characteristics of the teachers who would be participating in the project. The emphasis in the orientation session was on the "hands-on" aspects of the workshop sessions. Each instructor was admonished to talk for only 15 - 20 minutes before beginning the experimental activities so as not to frustrate the teachers. Although most of the teaching staff were faculty members, most had never taught a course to elementary teachers. After teaching, however, most indicated that they had enjoyed working with the teachers. All expressed a desire to work with teachers again in the future. The teachers rated most of the presenters very highly on their evaluation instruments, but some were viewed as being either too technical in the presentation or too "condescending" to the teachers. Follow-up sessions with these instructors helped them to improve for future sessions.

E. Collaboration

As stated earlier, the collaborative effort during the workshop presentation was primarily between Alabama A & M University, the NASA Marshall Space Flight Center, the A & M - UAH Regional Inservice Education Center, and the Johnson Environmental Center. However, the Lawrence Livermore National Laboratory, which developed the curriculum materials used in the program, participated in the effort by co-sponsoring the national conferences held in January of 1987 and 1988 to publicize the workshop and project activities to faculty members from other Historically Black Colleges and Universities

(HBCU's) around the nation.

Some local organizations also participated in the collaboration. The local hospitals donated old x-rays of human chest cavities and other areas (minus the patient identification information), local bottlers donated empty plastic 2-liter bottles, and Alabama A & M donated bricks.

With regard to services to other educator groups, the Project Director made a presentation to participants in the Summer Training Institute at the University of Buffalo in 1987. The Institute was conducted for teachers of students in the minority student programs sponsored by the Center for Urban Affairs at the University. There were approximately 65 teachers in attendance at the session. The day after the presentation to teachers the Project Director made a presentation as part of a panel to approximately 125 minority students participating in the summer programs at the University. The visit was arranged by Mr. Clyde Foster, who was then Director of the Office of Equal Opportunity at the Marshall Space Flight Center and technical monitor of this Other presentations included a paper presented at the annual meeting of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) held in San Francisco, CA in April 1987. Additionally, a presentation was made in October, 1988 at the First Annual Symposium for Black Americans in Science, Engineering, and Technology, held at the NASA Johnson Space Center in Houston. Presentations were also made at the annual NASA/HBCU Conference held in 1986 and 1987 in Atlanta, Georgia; to the PTA of the Academy for Academics and Arts Elementary and Middle School in Huntsville; and a teacher workshop held in April 1988 in Hampton, Virginia.

The elementary and middle schools of the participating teachers were not intimately involved in the planning of this project. However, several participating teachers were referred to the program by their principals. No facilities were provided by the schools, but the participating teachers actually became part of the teaching staff on the final day when they made presentations to their fellow participants.

Other than the presentations by teachers, all workshop activities were planned by faculty from Alabama A & M University and the NASA Marshall Space Flight Center. The University provided the classroom facilities and some equipment (such as plant models) for use in the workshop.

F. Curriculum and Materials Planning

The curriculum for this project was taken from the Lawrence Livermore National Laboratory's Elementary Science Study of Nature (Project LESSON). The four basic science areas of physics, chemistry, biology, and electricity and magnetism were the topics of study. These topics are included in the workshop curriculum because these are the topics that are covered in elementary and middle school science. The curriculum materials stress the contributions of minority scientists; use low-cost, easily accessible materials; and are exciting

to students and teachers. Thus, they are especially useful to this population of teachers.

Other workshop materials were taken from other sources that stress experiential science learning activities. The "Sounds of Science" materials developed by Dr. Carole Hardeman at the University of Oklahoma are particularly effective in showing middle school students successful minority, female, and handicapped scientists at work. Some of these materials were used during the workshop. Additionally, books with science experiments for children were constantly used as reference materials.

G. Participant/Project Monitoring and Evaluation

The project activities were monitored daily by the Project Director, and informal teacher feedback sessions took place throughout the two week sessions. Additionally, a written evaluation form was completed by participants at the conclusion of each workshop. They indicated strengths and weaknesses of the workshop activities. (The appendix contains the completed evaluation forms from each of the three workshops.) The oral and written evaluations were quite helpful in making minor modifications in the workshop activities. However, since most of the comments were overwhelmingly positive, the teachers indicated that they say little need for changes.

The long-term evaluation plans were not nearly as successful as the short-term evaluations. The Project Director met with little success in obtaining responses to questionnaires distributed to teachers. Follow-up telephone calls also did not yield the promised completed questionnaires. More pressure should have been placed on the teachers to get this information submitted, but this was not applied in enough instances. Hence, the only long-term evaluation data is in the form of verbal reports from teachers (and principals) who continue to indicate that the workshop has had a tremendous impact on the science activities of their students (and teachers). In retrospect, it would probably have been useful to obtain signed contracts from teachers who participated, as well as kept in closer contact with them after the workshop activities were over.

The pre-test and post-test data indicate that teachers do make significant gains in science knowledge during the workshop. Follow-up post-testing on one sample of teachers demonstrated that there is no significant loss of these gains up to six-months after the workshop has ended.

H. Fiscal and Development Activities

The financial incentives for project participants were not direct in the sense that teachers did not receive a stipend or a travel allowance. However, teachers did receive approximately \$400.00 worth of science equipment to use in their classrooms, and this was a great incentive for them to participate.

Activities to generate non-NASA support included a presentation to the Parent Teacher Association of one of the local schools, contacting the Army Missile Command's Office of University Relations, continuing the collaboration with the Lawrence Livermore National Laboratory, and utilizing State funds provided by the Regional Inservice Education Center. The resources provided by these agencies included loan of personnel, financial assistance to conduct the national conference, and assistance with the publicity activities of the workshop. Additionally, future workshop activities were included for funding in a 1988 proposal to the National Science Foundation for a Minority Resource Center of Excellence at Alabama A & M University. This proposal has been funded, and future workshop activities will not require funding from NASA. Hence, the Project goal to continue the activities after NASA funding ceased has been realized.

Service Delivery

The workshop activities were conducted almost entirely as planned. However, post-workshop activities deviated somewhat from the plan. First, the classroom visitations were more difficult to schedule than had been anticipated. Most of the teachers were hesitant to have an observer in the classroom, and the Project Director was not insistent enough that the visitations be made. However, the Project Director did visit the classrooms of approximately ten of the participants, and the responses of the students to the materials were quite enthusiastic.

A. Diagnostic

As for diagnostic testing of individual participants, a pre-post test of cognitive science knowledge was administered. No standardized tests were administered because it was necessary that the testing instrument reflect the special characteristics of the instruction provided by the Project.

B. Instructional

The formal instructional process included approximately four hours of instruction per day. The four hour period was divided into three or four approximately equal blocks of time to study three or four lessons within a given subject area. (See workshop outlines for each year in the appendix to this report.) As many as three or four different scientists would present information to the teachers on a particular day. The format was particularly effective in keeping the material interesting at all times. Mot of the time was spent with the teachers actually doing science rather than listening to persons talk about science. The cooperation and comraderie that developed among the participants was excellent. They did not appear to be at all inhibited from fully participating in any of the activities and helped each other considerably. A copy of some of the lessons covered during the workshop is attached to this report.

C. Counseling/Advising

There was no explicit counseling component to this project. However, the participants were given information on science careers and shown resource materials (e.g. "Sounds of Science") that were designed to motivate students to pursue technical careers. They were also given information on the scientific manpower needs of this country and our inevitable inability to meet these needs by the year 2000 if we do not interest more students in pursuing science as a career. The participants were provided with resource materials that would be especially effective in getting minority, female, and physically handicapped students interested in science.

D. Other Service Delivery

Follow-up visits have established that the project participants share the materials and philosophy of Project SIP with their peers in their home school. Although they rarely present formal workshops (most teachers are reluctant to do this after a two-week workshop) there is much informal assistance to other teachers in their schools. It is quite common that a teacher will indefinitely "loan" materials that are associated with curriculum topics that she/he does not teach to the appropriate teacher who covers those topics in her/his science classes. For example, a third grade science teacher may loan the materials on surface tension or electrical circuits to the fifth grade teacher who teaches those topics. In this way, one participant may influence the teaching of three or four other teachers in her/his school.

Participant Outcomes

This project was designed to enable teachers to effectively teach science concepts in an exciting way using a variety of hands-on materials, as well as devise their own hands-on activities based on their individual curricula for use in their classrooms. To this end, the teachers are encouraged to develop one hands-on activity for demonstration to the workshop participants at the end of the workshop. This particular workshop activity was very successful. Each teacher enjoyed sharing with the others, and there were a series additional activities that each teacher could add to her/his repertoire at the conclusion of the workshop.

Whereas this project did not address the application of math and science concepts to engineering, the project did stress the importance of integrating science throughout the curriculum. Teachers were shown ways in which science activities could be incorporated into the teaching of English, reading, writing, social studies, health, and writing. Thus, the instructional skills of the teachers improved in science as well as in other areas as a result of this project.

When the participants left the two-week workshop, they were quite eager to try out the new materials in their classrooms, and appeared motivated to incorporate the workshop philosophy and instructional techniques in their classroom to increase science interest on the part of their students. The few evaluation questionnaires returned further documented this result.

Project Dissemination

Information concerning the project was disseminated via presentations to the local, regional, and national groups mentioned earlier. A detailed description of the project and activities was published in The Proceedings of the Fourteenth Annual Meeting of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers in 1987. The project description will also appear in the Proceedings of the First Annual Symposium for Black Americans in Science, Engineering, and Technology to be published by CASET, the Center for the Advancement of Science, Engineering, and Technology. In addition, the Project content and philosophy have been discussed in teacher education courses at both Alabama A & M University and the University of Alabama in Huntsville.

Conclusion

The Alabama A & M University Elementary and Middle School Science Improvement Project (Project SIP) successfully completed the work outlined in the "Statement of Work" as appears in attachment J-1 of NASA Contract NAS8-36277. A two week workshop was held for thirty North Alabama teachers in year one of the project, and for twenty-four and fourteen teachers during the second year of the project and the four months which were covered by the extension of the project, respectively. Thus a total of sixty-eight (68) teachers and approximately four thousand (4000) students have been impacted by the project to date. However, when one considers the mini-workshops conducted by the Project Director and the "teacher cooperation" effect, the numbers accelerate exponentially. Hence, the Project has had a significant impact on science teaching in North Alabama schools. Additionally, a variety of area scientists were involved in presenting information to the teachers and in performing activities with them. The NASA teacher astronaut finalist interacted with North Alabama elementary and middle school teachers and students to a limited extent. (The extent was limited due to the unfortunate Challenger The NASA Marshall Space Flight Center Public Affairs Office provided the participants with numerous resources, and the teachers were introduced to some of the exciting science activities that occur at Marshall.

The teaching of science in the classrooms and schools of the teachers participating in Project SIP has been positively affected by Project SIP activities, and area teachers have indicated that they are looking forward to future workshop activities of this type.

Acknowledgements

The Project Director wishes to express her sincere appreciation to Mr. Lewin Warren and the staff of the Office of Equal Opportunity at NASA Headquarters; Mr. Clyde Foster, Mr. James Rice, and Mr. Robert Walker, Jr. for serving as technical monitors of the Project; Mr. William Anderson, Public Affairs Director at NASA Marshall Space Flight Center; Dr. Annie Wells and the staff of the Regional Inservice Education Center; Mr. Anthony Onyeabo, materials manager for the Project; all of the participating scientists from NASA, Alabama A & M University, and the University of Alabama in Huntsville; and all of the teachers who participated so enthusiastically in Project SIP activities. Each one, in his or her own way, personally demonstrated a firm belief that

"If it is to be, it is up to me!"

The future of science education in America is brighter because of the efforts of each of them.

Appendix 1

Project SIP Recruitment Information

Alabama A & M - UAH Regional Inservice Center Announces Summer Workshops for Area Science Teachers

Six science workshops to be held during the summer have been announced by the Regional Inservice Education Center. The workshops are designed to upgrade the skills of area teachers in the knowledge of science concepts and in the ability to teach science effectively to students in grades K - 12. The 1986 summer workshops are:

- 1. Physics Demonstrations for High School Teachers to be held June 11th from 8:30 a.m. until 12:30 p.m. at Huntsville High School. The workshop presenter is Ms. Dottie Dale, physics teachers at Huntsville High School. Tested demonstrations and laboratory exercises in physics will be presented.
- Project SIP (Formerly called Project LESSON) for teachers of grades 3 6 to be held June 16 27 from 8:30 a.m. until 12:30 p.m. on the campus of Alabama A & M University. Dr. Saundra McGuire is coordinating this workshop that provides basic instruction in the areas of biology, chemistry, physics, and simple electricity and magnetism. Teachers will receive materials to be used in their classrooms for the following year. The workshop is funded by NASA and will involve participation by NASA/MSFC personnel.
 - 3. <u>Hands-On Activities in Sounds of Science</u> for middle school science teachers to be held June 25, 1986 from 1:00 5:00 p.m. on the campus of Alabama A & M. The workshop presenter will be Dr. Carole Hardeman of Oklahoma.
 - 4. Activity Based Elementary Science to be held July 9th from 8:30 a.m. until 12:30 p.m. at Alabama A & M. The workshop will feature simple activities that can be used to peak student interest in science.
 - 5. What Research Says to the Science Teacher to be held June 20th from 10:30 a.m. until 12:30 p.m. The workshop, to be conducted by Dr. Dorothy Gabel of Indiana University, will present research developments in K-12 science education, as well as show teachers what classroom techniques are effective in teaching science as demonstrated by research studies. Project SIP participants will participate in this workshop along with any other interested persons.
 - 6. Chemistry for Elementary Students July 16, 1986 from 1:00 5:00 p.m. at Alabama A & M University. The presenters will be members of the Alabama A & M Chemistry Department. Topcis to be discussed will include acids and bases, atomic structure, chemical reactions, and states of matter.

Additional workshops may be planned if there is sufficient interest. Anyone interested in participating in any of the workshops listed above should contact Dr. Saundra McGuire, Department of Chemistry, Alabama A & M University at 859-7328 or 29, or The Regional Inservice Education Center at 859-7393 or 94.

MEMORANDUM F

To: Teachers Who Will Participate in the Project SIP Workshop

From: Saundra McGuire, Project SIP Coordinator

Date: July 6, 1987

Re: Workshop Details

Congratulations on your selection as a participant in the second Alabama A & M University Department of Chemistry - NASA sponsored Project SIP summer science workshop for elementary and middle school teachers. I can promise you an exciting and productive two weeks!

In addition to confirming your participation in the workshop, this letter is to provide you with the following details about the activities.

1. The workshop will be held from 9:00 a.m. until 1:00 p.m. daily from July 13 - 24. The activities will be held in Room 302 Carter Hall on the campus of Alabama A & M University. The schedule of activities is as follows:

July 13	Introduction & Overview of Workshop
July 14 - 15	Biology Units
July 16 - 17	Physics Units
July 20 - 21	Electricity & Magnetism Units
July 22 - 23	Chemistry Units
July 24	Teacher Presentations and
	Closing Activities

There will be short break periods during the daily sessions. Feel free to bring a snack for the break periods. Coffee and tea bags will be provided each day.

You will receive approximately \$400.00 worth of science equipment for use in your classroom. The items range from candles and compasses to microscopes and motors. These items will be available to take home during the workshop and will be kept in your classroom during the school year.

- 3. If you find it impossible to attend at least eight of the ten workshop sessions, please call me as soon as possible so that I can discuss the feasiblity of your taking the workshop. Past experience has shown that participants who miss more than one session are not able to gain maximum benefit from the SIP materials.
- 4. We will ask that you allow us to do some follow-up activities in your classrooms next year. Our NASA contract requires that we do some evaluation activities to see if the materials are useful to you in the classroom. We would like to visit your class at some time during the year when you are using the SIP materials. You may also be asked to informally evaluate some of the materials.

If you have any questions concerning the workshop please call me at 859-7328 or -7329 days or 852-4454 evenings. Since I am in and out of the office daily, please leave a message with the secretary if I am not in, and I will return the call as soon as possible.

I hope you are having a good summer, and I look forward to seeing you July 13th.

Appendix 2
Roster of Project SIP Participants

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Area Coordinator Solling CG	Address			Fyrre, AL 339/1 2306 Bell Avenue	156 Wilkerson Dr.	Z702 Sanelle Circle	1812 Forney Orive 837-5708	116 Robin Lane	Huntsville, AL 6410 Cedar Point Dr. 8593935	Huntsville, AL 11008 Vivian Drive	Huntsville, AL 3613 Chasewood Dr. Apt. 6	Huntsville, AL 35805 4278 Brian Green Dr.	Huntsville, Al 35802 2005 Brookmanor Orive 353-6476	Decatur, AL 35601 2010 Willis Road	Huntsville, AL 3580 2800 Poplar Avenue	Huntsville, AL 3321 Tucker Drive	ion	lony, AL 35//3 116 Thatch Lane	rive	Huntsville, AL 11017 Rockcliff Drive852- Huntsville, AL
· Area C	Name of Participant	Geraldine Miller	Peggy McDaniel	Gwendolyn Strong	Gwendolyn Foster	Geraldine Richards	Dollie Bradley	Dorothy Oliver	Gwendolyn Baldwin	Andryna Kuzimic	Vicki Roth	Patty Faust	Paula Kephart	Dorothy Upton	Joe Hinesley	Myrtle Binford	Billy Stevenson	Terry Davis	Bob Trammell	Ann Fults

Date

Inservice Activity

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WORKSHOP PARTICIPANT LIST	Date 7/31/86	nine Workshop Presentor S. Y. H. Guir et af	School Name of Subject Area System School Marter Posi	Tea	Sparkman High	West Mastin Lake Elem. "	- West Mastin Lake Elem. "	West Mastin Lake Elem. "	Pisgah High School	Flat Rock School " "	Pisgah High School "	Macedonia School "	=	Julian Newman ".	ORIGINAL OF POOR	PAGE IS QUALITY	
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Committee of the second	Inser	. Area	Name of Participant	Jerome Foster	Sandra Saunders	Betty Vaughn	Jan Renshaw	Joyce Tittsworth	Martha Mckenzie	Bobby Jenkins	Marie Everett	Betty Bailey	Katie Jones	Caulyne Hayden	•		

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A&M-UAH REGIONAL INSERVICE EDUCATION CENTER

WORKSHOP PARTICIPANT LIST

Inservice Activity

Workshop Consultant/Presentor Area Coordinator

Area Position	6 Eduade	classreom	10 Regen	Elem. Ed	24	6 th.	5+4	7 5 8 th	JANA WILL				•	•				
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County	Madison	Marsha!/				Jackson	Jackson	Madison	Madison									
Phone Number	882-22-56 Madison	593-8223 Marshall	3848 8 615-725-6403 Machin	8584653														
Complete Address Street, City Zip Code	1307 Wind River Cir. Huxtsville - 55802	Rt2, Box 431-R Booz, At 35957	J.B.	FIST Meridianst	4116 Newson RG: 709 Huntsville, AL. 3585	RT. 5 BOX 59 SCOTTS BOY ON SISTING	Softshirt Description		1923 Sullingare	}								
Name of Participant	1. Sue Viall	2. Karen Hales	3. J:11 M: +Chell	Thelma Evans	s. Pamela Dudley	6. ELITH SMITH	7. Brenda Whospy	8. Maria Michel	9. Tor Branker	10.	11.	12.	13.	14.	15.	16.	•	

Sth Bridge 3 rd rade 5th grade 3rd onade Stronge of grade 3rd grade 三のかとり Position DRIGINAL PAGE IS 5/6 Com Marshall Co. Grassy Jr. High - Science. Mith 6-9 OF POOR QUALITY \vec{x}_i 51 X - X Date 7/56 - 1/ TARTIT SIENCE 6-8th Science Workshop Consultant/Presentor Sounder HC Cours Subject Matter Z 10 ±9 17 E HUHISVILLE GITY WESTLAWU MODE steet Medison Union brove Jones Valley Jones Valley Owens Cross Ellemen tary Classia, Pds Holy Family Huntsille City Substitute Heap lands Ridgecrest Woodw: 11e School Name A&M-UAH REGIONAL INSERVICE EDUCATION CENTER Hantsulle City Marshall Po. Huntsville City Diocese of B'her cty school thought the Surtanille Jackson Co. Madisan County Huntsville City madioon toly Family-System School monte Machian Carenter. WORKSHOP PARTICIPANT LIST Modison Sackson law Park Dise. madian Union Errore A13575 753-6318 Marshall Hivile 35801 534-2075 Madica Madison madus 753-6159 Marshall Madison Madison Jackson County MADISON 533-6724 574-6730 4969-188 1455E 10010410050 772-3364 852-9259 M'Guire 733-5174 1141-658 430 do84 Phone 952-4896 Number 150 44 ntsville. AL 358cB Area Coordinator Saund ra Vex 42 Complete Address 3906 Axlson Or. 35808 714 Sun Valley 2107 Barrywed Ro HWILL, AL 35816 Street, City 762 Laverne Dr. Miers Grove, Al 17 wille 35816 Zip Code TIME 0001W HSV AT Inservice Activity 205 11. Sandra Montpomen 5. Kenneth Bates 12. Janice Nolin husenbord 9. Gillie Simmons 10. 10. 1. nara Ork 3 x blism h. Coll 13/ BAIG BLEVINS 8. Gary Mahon 14. Kathy (100K Participant nomas -K.ta

Appendix 3
Schedule of Project SIP Activities

Science Improvement Project

SIF Frogram

Workshop Goal and Objectives

PROGRAM GOAL

The goal of this program is to enhance the teaching of science at the elementary and middle school level to prepare and inspire more students to pursue careers in science, engineering, and technology.

Workshop Objectives

- 1. To teach teachers basic concepts in the areas of physics, biology, chemistry, and electricity and magnetism that can be taught to elementary and middle school students.
- To demonstrate simple low-cost experiments that can be used to teach basic scientific principles to elementary and middle school students.
- 3. To improve teachers' confidence in their ability to effectively teach science by showing them that science is fun.
- 4. To provide teachers with the knowledge and materials necessary to improve the quantity and quality of science instruction in their classrooms.
- 5. To expose teachers to scientists at Alabama A & M University and local agencies who can serve as resource persons for their science classes.

Science Improvement Project (SIP Program)

Schedule of Activities June 16, 1986

8:30 - 8:45	Registration
8:45 - 9:00	Welcome Dr. Bessie Jones, Dean School of Arts & Sciences
9:00 - 9:30	Overview of Workshop or "Just What is SIP?" Dr. Saundra McGuire, Workshop Coordinator
9:30 - 9:45	Introduction of Participants
9:45 - 10:30	Fun & Games
10:30 - 10:45	Break
10:45 - 11:30	The Scientific Method
11:30 - 12:30	Lesson 39 - Senses & Skills

Science Improvement Project (Project SIP)

Schedule of Activities

June 17- 27

June 17th - 18	th <u>Biology</u>								
	June 17th								
Lesson 34 Lesson 37 Lesson 38	Characteristics of Living Things Organs of Man Microorganisms	Mr. Wiley Henderson Dr. Charles McMillan Dr. Rather Brown							
June 18th									
Lesson 35 Lesson 40 Lesson 36 Lesson 41	Structure of Living Things Plants Function of Cells Water & Life	Mrs. Katie Jones Mr. Wiley Henderson Dr. Charles McMillan Dr. Rather Brown							
June 19th - 20	th <u>Physics</u>								
	June 19th								
Lesson 2 Lesson 3 Lesson 4 Lesson 5	Forces Moving Bodies Pressure Surface Tension	Dr. Jeffrey Wang Dr. Jeffrey Wang Dr. M. D. Aggarwal Dr. M. D. Aggarwal							
	June 20th								
Lesson 7 Lesson 13 Lesson 9 Lesson 10	Electric Force & Charge Light Temperature Thermal Expansion	Dr. Walter Watson Dr. Saundra McGuire Dr. Saundra McGuire Mrs. Katie Jones							

June	23rd -	- 24th
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Electricity & Magnetism

June 23rd

Lesson 18 Lesson 19 Lesson 23	Electrical Circuits Magnets Computers	Mr.	J. B.	Turner Turner Thompson
	June 24th			
Lesson 20 Lesson 21 Lesson 22	Generators & Motors Alternating Current Sending Messages	Mr.	J. B.	Turner Turner Turner

June 25th - 26th

Chemistry & Miscellaneous

June 25th

Lesson 24	Molecules	Dr.	Libby Chou
Lesson 29	Compounds & Solutions	Dr.	Saundra McGuire
	Alternate Energy Sources	Mr.	Bernie Levine
Special Lesson	NASA's Teacher Center	Mr.	Bill Anderson

June 26th

Lesson 30	Acids & Bases	Dr. Saundra McGuire
Lesson 31	Carbon Dioxide	Dr. Saundra McGuire
Lesson 33	Uses of Chemistry	Dr. Saundra McGuire
Special Lesson	Environmental Education	Mr. Bernie Levine

June 27th		Culminating	Activities
Lesson 14	Astronomy		

Individual Presentations by Teachers

Presentation of Certificates

Mr. Clyde Foster,

Dr. Saundra McGuire

NASA/MSFC

The 1986 SIP Program in Review

Science Improvement Project (SIP Program)

Schedule of Activities July 13, 1987

9:00 - 9:15	Registration
9:30 - 9:35	Welcome Dr. Bessie Jones, Dean School of Arts & Sciences
9:35 - 9:50	Overview of Workshop or "Just What is SIP?" Dr. Saundra McGuire, Workshop Coordinator
9:50 - 10:00	Introduction of Participants
10:00 - 10:30	Fun & Games
10:30 - 10:45	Break
10:45 - 11:15	The Scientific Method
11:15 - 12:00	Lesson 39 - Senses & Skills
12:00 - 1:00	Science Education & NASA Mr. Bill Anderson, Director

NASA Public Affairs Office

Science Improvement Project (Project SIP)

Schedule of Activities

July 14 - 23

	July 14t	th - 15	5th	Biolo	pgy			
				July	14th			
	Lesson 34 Supplement Lesson 37 Lesson 38	nt 7	Characteris Crystal Gro Organs of N Microorgani	owth 1an	of Living	Things	Mr. Dr.	Saundra McGuire Hal Tippins Charles McMillan Rather Brown
Ī				July	15th			
	Lesson 35 Lesson 46 Lesson 45	5 5	Structure of Plants Function of Water & Life	F Cell		:	Mr. Dr.	. Katie Jones Wiley Henderson Charles McMillan Rather Brown
	July 16th	n - 17	th	Phys	sics			
				Jul	y 16th			
	Lesson 2 Lesson 4 Lesson 5 Lesson 7		Forces Pressure Surface Ter Electric Fo	orce &	_		Dr. Dr.	Walter Watson M. D. Aggarwal M. D Aggarwal Walter Watson
				J	July 17th			
	Lessons 9	7	Temperature	2			Dr.	Stephen C. McGuire

Dr. Stephen C. McGuire

Dr. Edwin Reichmann

Dr. Allen Gary

Thermal Expansion

Light

Photography

Lesson 10 Lesson 13

Lesson 14

July	20th	-	21st

Electricity & Magnetism

July 20th

Lesson 18 Lesson 19 Lesson 23	Electrical Circuits Magnets Computers	Mr.	J. B.	Turner Turner Thompson
	July 21st			
Lesson 20 Lesson 21 Lesson 22	Generators & Motors Alternating Current Sending Messages	Mr.	J. B.	Turner Turner Turner
July 22nd - 23r	Chemistry & Miscellaneou	<u>s</u>		
July 22nd ·				
Lesson 24 Lesson 29 Lesson 30	Molecules Compounds & Solutions Acids & Bases	Dr.	Libby Saund Don Fr	ra McGuire
July 23rd				
Lesson 31 Lesson 33	Carbon Dioxide Uses of Chemistry			ra McGuire ra McGuire

Lesson 14

<u>Culminating</u> <u>Activities</u>

Individual Fresentations by Teachers

Astronomy

Presentation of Certificates

Mr. James Rice

Dr. Edward Reichman

NASA/MSFC

The 1987 SIF Frogram in Review

Science Improvement Project (SIF Program)

Schedule of Activities July 25, 1988

9:00 - 9:15	Registration
9:30 - 9:35	Welcome Dr. Bessie Jones, Dean School of Arts & Sciences
9:35 - 9:50	Overview of Workshop or <i>"Just What is SIP?"</i> Dr. Saundra McGuire, Workshop Coordinator
9:50 - 10:00	Introduction of Participants
10:00 - 10:30	Fun & Games
10:30 - 10:45	Break
10:45 - 11:45	The Scientific Method
11:45 - 1:00	Lesson 39 - Senses & Skills

Science Improvement Project (Project SIP)

Schedule of Activities

July 26 - August 5

	July 26th - 27	th <u>Biology</u>		
		July 26th		
	Lesson 34 Lesson 35 Lesson 36 Lesson 37	Characteristics of Living Thing Structure of Living Things Function of Cells Organs of Man	Dr. Dr.	Wiley Henderson B. Mangat Charles McMillan Charles McMillan
_/		July 27th		
	Lesson 40 Lesson 39 Lesson 41	Plants Microorganisms Water and Life	Dr.	Wiley Henderson Rather Brown Rather Brown
	July 28th - 29th	h <u>Fhysics</u>		
		July 28th		
	Lesson 2 Lesson 3 Lesson 4 Lesson 5 Lesson 7	Forces Moving Bodies Pressure Surface Tension Electric Force & Charge	Dr. Dr. Dr.	Jeffrey Wang Jeffrey Wang M. D. Aggarwal M. D. Aggarwal Walter Watson
		July 29th		
	Lessons 9 Lesson 10 Lesson 12 Lesson 13	Temperature Thermal Expansion Sound Light	Dr. Dr.	Saundra McGuire Saundra McGuire M. D. Aggarwal Saundra McGuire

August 1st - 2nd

Electricity & Magnetism

August 1st

NASA Educationa Lesson 18 Lesson 19	l Resources Mr. Will Robert Electrical Circuits Magnets	Mr.	J. B. Turner J. B. Turner
	August 2nd		
Lesson 20 Lesson 21 Lesson 22	Generators and Motors Alternating Current Sending Messages	Mr.	J. B. Turner J. B. Turner J. B. Turner
August 3rd - 4	th <u>Chemistry & Miscellaneou</u>	<u>5</u>	
August 3rd			
Lesson 24 Lesson 29 Lesson 30	Molecules Compounds & Solutions Acids & Bases	Dr.	Libby Chou Saundra McGuire Saundra McGuire
August 4th			
Lesson 31 Lesson 33 Lesson 14 Lesson 23	Carbon Dioxide Uses of Chemistry Astronomy Computers	Dr. Dr.	Saundra McGuire Saundra McGuire Saundra McGuire James Thompson

August 5th

<u>Culminating</u> <u>Activities</u>

Individual Presentations by Teachers Presentation of Certificates

Mr. James Rice NASA/MSFC

The 1988 SIP Program in Review

Science Improvement Project (SIP Program)

Schedule of Activities

August 5, 1988

9:00	- 10:00	Lesson 14 Astronomy
10:00	- 10:30	Post-test and Scoring
10:30	- 10:45	Break
10:45	- 11:45	Individual Teacher Fresentations
11:45	- 12:00	Presentation of Certificates Mr. James Rice, NASA/MSFC
12:00	- 1:00	Workshop Evaulation

HAVE A PRODUCTIVE 1988 - 89 SCHOOL YEAR!

Appendix 4
Project SIP Workshop Evaluation Forms

Name		7
Vate	6-176 thry 6-27 Location Ala A+M	
1.	How well did this workshop succeed in meeting the objectives set forth at	
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	Indicate the degree to which the content of this workshop is relevant to your work assignment.	
	Poor 1 2 3 4 5 6 7 8 9 10 10	
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1. How well did this workshop succeed in meeting the objectives set forth at the beginning of the workshop? Circle the number. Excellent 1. Fixed the degree to which the content of this workshop is relevant to your work assignment.		
	Poor Excellent	
5.	Briefly comment on the following:	
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Name	of Workshop Science Improv.	Worksh. Hork	shop	Presentor Dr. M. Guine
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	Indicate the degree to which the your work assignment.	content of thi	s wor	kshop is relevant to
	Poor 1 2 3 4 5 6	7 8	9	Excellent 10
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4.	Circle the number that represents	your overall	evalu	ation of the workshop.
	Poor 1 2 3 4 5 6	7 8	9	Excellent 10
5.	Briefly comment on the following:			
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	Beefup the phy super	siès porti	مہ -	- everything else was
	b. In your opinion, what are the explain. Physics portion		ses o	f the workshop? Please

INSERVICE ACTIVITY EVALUATION FORM

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I enjoyed the workshop. Mrv. Me Line did an excellent job!

INSERVICE ACTIVITY EVALUATION FORM

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	a. 1	What c you? P	hange(s 1ease e	s) in explai	the wo	rkshop	would experi	liave i	made i	it more bo	meficial	for
•			B: log	ica/	SLien	دو	·					
	b. 1	in you explai	n.		hat ard					of the wor	kshop?	Pleasc

I enjoyed it very much !!

Name	of W	orksho	p								Saudon H ? Guir
Date	² <u>—</u> —	6/21/	86			· · · · · · · · · · · · · · · · · · ·	_ Loca	tion _	a + 2	n. Univers	ity
1.								eting the number		jectives set	forth at
•	Excel		8 -	7	6	5	4	3	2	Poor I	
2.		ate th work a			which	the co	ontent	of th	ls wor	kshop is rel	evant to
	Poor 1	2	3	4	5	6	()	8	9	Excellent 10	
3.			erials	were	adequa	ite and	d pert	inent.			
	Excel		8	7	6	5	4	3	2	ľoor I	
4.	Circl	e the	number	that	repres	sents	your o	verall	evalu	ation of the	e workshop.
	Poor 1	2	3	4	5	6	7	8	9	Excellent 10	
5.	Brief	ly com	ıment c	on the	follo	ving:	-				
		ou? Pl	lease e	explai	n.		11. 1	ut 1	ınder	stand some	e of the
·		sp	eaker	V, a	. C m	sise	uvao eu etelu	va,	broke	lem, as s	well as
		7/10	opini	u	source	any		, ,		of the works	

	INSERVICE ACTIVITY EVALUATION FORM	
Nam	Saurdra McQui ne of Workshop Science Improvement Workshop Presenter Dr. Starters	re
Vat	e June 27, 1986 Location A+M University	
	How well did this workshop succeed in meeting the objectives set forth at the beginning of the workshop? Circle the number.	
(Excellent 100 9 8 7 6 5 4 3 2 1	
	Indicate the degree to which the content of this workshop is relevant to your work assignment.	
-	Poor Excellent 1 2 3 4 5 6 7 8 9 10	
3.	Handout materials were adequate and pertinent. Excellent	
	10 9 8 7 6 5 4 3 2 J	
4.	Circle the number that represents your overall evaluation of the workshop. Poor $1 2 3 4 5 6 7 8 9 10$	
5.	Briefly comment on the following:	
	a. What change(s) in the workshop would have made it more beneficial for you? Please explain. - Kits Should be More accurately prepared - Room temperature uncomfortable - Several speakors were difficult to understand b. In your opinion, what are the major weaknesses of the workshop? Please explain.	
動		
	Strengths - Will be able to use materials in class this 1986-87 year. At least 1/2 the kosons are relevant to Units tausht.	

of Science program for next year. (+ future years).

INSERVICE ACTIVITY EVALUATION FORM

Name	e of	Wor	ksho	P	<u>icien</u>	oe .	Taipe	DUCIN	en Worl	ROJ C	Presentor	<u>De. 11</u>	le Lair
Date		لو	15	7 –	<u> </u>	7		_ Loca	tion _	AA			
1.					is work f the w						jectives s	et forth	at
	Exce	7	nt 9	8	. 7	6	5	4	3	2	Poor I		
2.					gree to nment.	which	the c	ontent	of th	ls wor	kshop is r	elevant t	o
	Poor 1	r 2		3	4	5	6	7	8 _	9	Excellen 10	t	
3.	llane	dout	mat	eria	ls were	adequ	ate and	d pert	inent.			<u>.</u>	•
. '(Exc.	lle	nt 9	8	. 7	6	5	4	3	2	Poor 1	·	
4.	Cir	cle	the	numb	er that	repre	sents ;	your o	verall	evalu	ation of t	he worksh	ւօր.
	Poo ^r I	r 2		3	4	5	6	7	8	9	Excellent (10)	t	
5.	Brie	efly	com	ment	on the	follo	wing:	<u>.</u>					
	a.			_	(s) in explai		rkshop	would	have r	nade i	t more ben	eficial f	or

b. In your opinion, what are the major weaknesses of the workshop? Please

explain.

• •					INS	ERVIC	E ACTIV	ITY E	VALUAT	LON FOR	M		
				Sc	ence	e Imp	ravem	ent P	roject				
ر Nam	e of	Wor	kshoj	p <u>5</u>	IΡ				Worl	kshop I	rescutor _	Dr. McGuir	ت
Dat	e	4	us-e	22	7,19	86.	<u>-</u>	Loca	tion <u>/</u>	Mr	Unive	rs.ity	
1.	llow the	wel beg	l di inni	d this	works	shop s orksho	ucceed p? Ci	in me rcle t	eting he num	the obj	jectives so	et forth at	
	Exc	elle	nt								Poor		
(10)	9	8	7	6	5	4	3	2	1		
2.				e degr ssignm		which	the c	ontent	of th	is wor	kshop Is r	elevant to	
	Poo 1	r 2	!	3	4	5	6	7 (8	9	Excellen 10	t	
3.	Han	dout	mat	erials	were	adequ	ate an	d pert	inent.				
	Exc 10	elle	nt 9	8.	. 7	6	5	. 4	3	2	Poor 1	./	
4.	Cfr	·c1e	the	number	that	repre	sents	vour c	verall	. evalu	ation of t	he workshop.	

5. Briefly comment on the following:

3

Poor

2

• a. What change(s) in the workshop would have made it more beneficial for you? Please explain.

Dr. McGuire gave the most beneficial lessons. She was more interesting in presenting the lessons. She was very energetic!

Excellent

b. In your opinion, what are the major weaknesses of the workshop? Please explain.

the beginning of the workshop? Circle the number. Excellent 1 9 8 7 6 5 4 3 2 1 2. Indicate the degree to which the content of this workshop is relevant to your work assignment. Foor 1 2 3 4 5 6 7 8 9 10 3. Handout materials were adequate and pertinent. Excellent 10 9 8 7 6 5 4 3 2 1 4. Circle the number that represents your overall evaluation of the workshop. Poor 1 2 3 4 5 6 7 8 9 10 5. Briefly comment on the following: a. What change(s) in the workshop would have made it more beneficial for you? Please explain. All Overa Were rest relevant to my teaching assignment but the workshop were all the purpose at forth. I think the workshop we was at forth.	1.										jectives set fo	orth at
your work assignment. Poor 1 2 3 4 5 6 7 8 9 10 3. Handout materials were adequate and pertinent. Excellent. 10 9 8 7 6 5 4 3 2 1 4. Circle the number that represents your overall evaluation of the workshop. Poor 1 2 3 4 5 6 7 8 9 10 5. Briefly comment on the following: a. What change(s) in the workshop would have made it more beneficial for		Excel.	lent								Poor 1	
3. Handout materials were adequate and pertinent. Excellent. O 9 8 7 6 5 4 3 2 1 4. Circle the number that represents your overall evaluation of the workshop. Poor 1 2 3 4 5 6 7 8 9 10 5. Briefly comment on the following: a. What change(s) in the workshop would have made it more beneficial for	2.	Indica your	ate th	ie deg Issigni	ree to ment.	which	the o	content	of th	is wor	kshop is releva	unt to
Excellent. 10 9 8 7 6 5 4 3 2 1 4. Circle the number that represents your overall evaluation of the workshop. Poor 1 2 3 4 5 6 7 8 9 10 5. Briefly comment on the following: a. What change(s) in the workshop would have made it more beneficial for	W	Poor I	2	3	4	5	6	7	8	9		
4. Circle the number that represents your overall evaluation of the workshop. Poor 1 2 3 4 5 6 7 8 9 10 5. Briefly comment on the following: a. What change(s) in the workshop would have made it more beneficial for	3.	llando	ut mat	erial	s were	adequ	ate ai	ıd pert	inent.			
Poor 1 2 3 4 5 6 7 8 9 10 5. Briefly comment on the following: a. What change(s) in the workshop would have made it more beneficial for				8	. 7	6	5	4	3	2	_	
Poor 1 2 3 4 5 6 7 8 9 10 5. Briefly comment on the following: a. What change(s) in the workshop would have made it more beneficial for	4.	Circl	e the	numbe	r that	repre	sents	your o	verall	. evalu	ation of the w	orkshop.
a. What change(s) in the workshop would have made it more beneficial for					_			·				
" n n1	5.	Brief.	ly com	nment	on the	follo	wing:	•				
all area were not relevant to my teaching assignment, but the workshop is			7 51								`	
		all	ou: PI . Oreca	L Wer	explai د مم	n. Trele	vent.	to m	7 tea	ching	assignment,	but the work
excellent with the plan now being used.		2	rcel	lent	wit	h th	e pl	in n	ow s	being	ward.	
b. In your opinion, what are the major weaknesses of the workshop? Please explain.		b. I	n your	opin								? Please

Na	me of	Worksho	Sp 5	cien	ce	Imp	? Pro	, Wor	kshop	Presentor D.S. Maguire	
bа	te 6.	-16 -	- 6	-2	7		_ Loca	tion _	Ok.	a'm u.	
										•	
1.		well di beginn:								jectives set forth at	
•	Exce	llent								l'oor	
٠, ٠	.00	9	8 :	. 7	6	5	4	3	2	1	
2.		cate ti work a	_		which	the c	ontent	of th	ıİs wor	kshop is relevant to	
	Poor	2	2		E	•	7	D	_9	Excellent	
•		2	3	, 4		О	,	О	_3		
3.	lland	out ma	terial	s were	adequ	ate an	d pert	inent.			
	• '	llent								Poor	
	(1)	9	8	. 7	6	5	4	3	2	1	
4.	Circ	le the	numbe	r that	repre	sents	your o	veral	l evalu	uation of the workshop.	
	Poor l	2	3	4	5	6	. 7	8	9	Excellent 10	
5.	. Brie	fly co	mment	on the	follo	wing:				-	
		ÿou? P	lease	explai	n. 5	iome	e of	~ T.	e f	t more beneficial for were,	
	h	AVE	be	m. L	Pr	Tec esen	hoic	oh s as	Prof	sors) Should model for how w	,
	b. Cu	In you explai	r opir	esemion, w	hat ar	Then the	major	weakn	Jur esses d	STUDENTS. of the workshop? Please	
	•	57	97e c	/	Ab	ove	-				

Ha	me of	Worksl	1017 <u>S</u>	ienti	fic I	-mpiou	tro	· No	rkshop	l'tescutor	Dr. S. M. Guire	
Vσ	t e	7/	30/	87		,	Loc	ntlon .	. A+	M Unix	Dr. S. M. Guire	
1.	the	beginn						eeting the no		bjectiven i	set forth at	
	Exce.	llent 9	8	7	6	5	4	3	2	l'oor L		
2.			he deg assign		whitel	ı the c	ontent	t of th	ıls wo	rkshop In t	celevant to	
	roor I	2	3	4	5	б	7	8	9	Excellen 10	it	
J.	Excel	llent				ate an	-			l'oor		
4.	(10)	g a tho	8	7	6	5	4		2 nvali	l estlou of t	he workshop.	
4.	Poor -		3	4	5	6		8	9	Excellen 10		
5.	Driel	1у сон	ment (on the	follo	tgnL:						
••	b. II	oui 12 Eve Noti n your xplain	esse (leng	wai	V W d C	ell he hajor h	pla cha weakuce	nge	land d. I the work:	ettetat for well ar ganize shop? Please	D
	<u> </u>	tan	Tas	tec	wo	uks	chap	, n	o u	veakne	ss.	

	SUBJECT MATTER WORKSHOP EVALUATION TOWN
	P' + C+0 - 17-24 (1.0'97
Nan	ne of Workshop. Stagect SIP Date 13-24 July 81
Wor	rkshop Presentor Dr. M (Quine) Location (pm
1.	How well did this workshop succeed in meeting the objectives set forth at the beginning of the workshop? Circle the number.
	Excellent
	10 9 8 7 6 5 4 3 2 1
2.	Indicate the degree to which the content of this workshop is relevant to your work assignment.
	Poor Excellent
	1 2 3 4 5 6 7 8 9 10
3.	Handout materials were adequate and perinent.
•	Excellent
	10 9 (8) 7 6 5 4 3 2 1
4.	Circle the number that represents your overall evaluation of the workshop.
	poor
	1 2 3 4 5 6 7 (8) 9 10
5.	Briefly comment on the following:
	a. What change(s) in the workshop would have made it more beneficial for you? Please explain.
	b. In your opinion, what are the major weaknesses of the workshop? Please explain.
	Some speakers were not
}'	prepared, didn't say anything (as far as I could tell) or dull.
•	
	Leacher Dr. Libby Chaw was Clear and understandable. 1.8 Stephen M. Zuise was
. `	Clacker Dr. Libby Chaw was
	Dr. Stephen m ()
	Que de la Suite man

			SUBJE	CI MAI	IEK WU	WK2110	LEVILL	סנואכ	H I UN		1/-	-
Nan	ne of Wor	rkshov	5	IA					Date 7	1/2	4/8	Z
	·			5	Ma	C	re I			7 d	111	-
WOI	rkshop Fi	resento		<u> </u>	1.10	<u> </u>	<u>, </u>			·		-
1.	How well	ll did beginni	this wo	rkshop he work	виссееd вhop?	in mee Circle	eting th	e obje ber.	ectives	s set	forth at	
	Excelle				•	,					<i>l'oor</i>	
	10	9	8	7	6				3	2	1	
2.	Indicat your	te the work a	degree ssigume	to which	h the c	ontent	of this	works	shop is		evant to	
	Poor								•	Exce	ellent	
	1	2	3	4	5	6	7	8	9	(10)	
3.	Handou t	mater	ials we	re adeq	uate an	d peri	ient.				Pagy	
	Excelle	ent					_		-	n	Foor 1	
	(10)) 9	8	7	6		; 4		3	2	1	
4.	Circle	the nw	nber tli	at repr	esents ,	your oi	erall e	valuai	tion of	the	workshop.	
	poor								_	Eπ	cellent	
	1	2	3	4	5	6	7	8	9		10)	
5.	Briefly	i commen	it on t	he foll	owing:	•						
	a. Wia	it chang	ge(s) i	n the wo	orkshop	would	have ma	de it	more l	enesi	icial for	
	y	ou? P	ease e مر	xpiain.		- 1	10	,	·. • /	Lin	1000	xcellen
	. /	Vo	7									
	b. In	your of lease	inion, explain	what as	re the i	major u	eakness	es of	the wo	rksho	pp?	•
		N	100	, <u>a</u>	٠	1						
}•		, .			$u_{\mu_{ij}}$	n			•			

Nan	ne of Wo	rkshon:	Do.	1/0 /-] f	\supset	Da	te 7/	24 /87
	oj	r nonop_	11/11/		_					1 1/
Wor	kshop P	resento	ralky	J 1	MEG	me		ocation	(1+	M. 412
	•		•	, ,	·					
1.	How we the	ll did beginni	this wo	rkshop he work	виссее вhop?	d in mee Circle	ting th	e objec ber.	tives se	et forth at
	Excelle		0		•	•		•		l'oor
	(10	9	9 8	7	. (5 5	4	3	2	1
2.	Indicat your	te the work a	degree ssigume	to which	h the d	content	of this	worksh	ор ів ге	elevant to
	Poor								Ea	cellent
	1	2	3	4	5	6	7	8	9	(10)
3.	llandout	: mater	ials we	re adequ	uate ar	nd perin	ent.			
	Excelle	nt						•		<i>l'oor</i>
	(1δ)	9	8	7	6	5	4	3	2	1
4.	Circle	the nu	mber the	at repre	esents	your ov	erall e	valuatio	on of th	e workshop
	poor									Excellent
	1	2	3	4	5	6	7	8	9	(10)
5.	Briefly	comme	nt on th	ie follo	wing:					
	a. Wha	t chang ou? P	ze(s) ir lease es	the wa plain.		would i		_	re bene	ficial for
			•				· ·			
			oinion, explain.		4 .	major we			e works	hop?
					. 11 0	v - J C		•		
3.1	•			٠.	W ₁₀ 2	n o				

Nan	ne of Worksho	p	SIP			<u></u>	Date	e 7.	24.87	
Wor	rkshop Presen	itor <u>Q</u>	1. 7ns	<u> Hur</u>	<u>. </u>	Lo	ocation_	AIN	V Warter	<u>; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; </u>
1.	How well di the begin	d this we	orkshop s the works	ucceed hop? 0	in meet ircle t	ing the	e object ver.	ives s	et forth at	
	Excellent			-	•				<i>l'oor</i>	
	(10)	9 8	7	6	5	4	3	2	1	
2.	Indicate the	e degree assignme	to which	the co	ntent o	f this	worksho	p is r	elevant to	
	Poor	•						E	xcellent	
	1 2	3	4	5	6	7	8	9	(10)	
			2			1				
3.	Handout mat	erials we	re adequ	ate ana	perine	nt.	•		<i>l'oor</i>	
	Excellent				_		7	2		
	(10)	9 8	? 7	6	5	4	3	4	1	
4.	Circle the	number th	at repre	sents y	our ove:	rall ei	aluatio	of t	he workshop.	
	poor			•					Excellent	
	1 2	3	4	5	. 6	7	8	g	(10)	
5.	Briefly com	ment on t	he follo	wing:						
	a. What che	Planca a	mn7ain						eficial for	
		Br	y i	ع الحد	m 9 8	0-10	2 and c	id 1	D. Mark	
	b. In your Please	opinion, e explain	what ar	e the m	ajor wed	aknesse	s of the	e work	shop?	
				and the same						
; ,			· .,	W free	9					

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Nam	e of Wor	rksliov	Pro	ect	SI	P		Dat	e 7/2	24/87
Wor	kshop Pr	esent	or Dr	Sau	udra	Mc &	luie L	ocation_	lla.	4. E M
1.	llow well	l did	this wo	orkshop the work	succeed shop?	l in mee Circle	ting the	e object ber.	ives s	et forth at
	Excelle					٠				<i>l'oor</i>
	10		9 8	7	. 6	5 5	4	3	2	1
2.	Indicat your	e the work d	degree issigime	to whic	h the c	ontent	of this	worksho	p is r	elevant to
	Poor								E:	xcellent _
	1	2	3	4	5	6	7	8	9	10
3.	llandout	matei	ials we	re adeq	uate an	d perin	ent.	·		
	Excelle				•			•		<i>Poor</i>
	10	S	9 8	7	6	5	4	3	2	1
4.	Circle	the nu	mber th	at repr	esents	your ov	erall e	valuatio	n of th	le workshop.
	poor									Excellent
	1	2	3	4	5	6	7	8	g	(10)
5.	Briefly	conme	ent on t	he foll	owing:					·
	a. Wha	t chan ou? F	ige(s) i Please e	n the w xplain.	orkshop	would	have mad	le it mo	re bene	eficial for
	-						v.			
	b. In p	your o lease	pinion, explain	what a	re the	major w	eaknesse	es of th	e works	shop?

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				**** *	- 1					Δ			_	
Nam	e of Work	shop_	<u>5I</u>	P		4	. 		_ Date	<u>, J</u>	ily	1-24,1	<u>-18</u> 7	c
Wor	kshop Pre	sentor	· <u>D</u> L	SALL	nella	Y11-1	weed	Loca	ition_	_(;.(la	. (11	ne Ma	co.
1.	How well	did t	this wo	orkshop the work	succeed shop?	'in mee Circle	eting the n	the c unber	obje c ti	ives	set	forth at		
	Excellen				•	•						<i>Foor</i>		
	10)	9	ł	3 7	6	· •	5	4	3		2	1		
2.	Indicate your w	the d	legree Isigivne	to whice	h the c	ontent	of the	is wo	orkshol	is				
	Poor										Exce	llent		
	1	2	3	4	5	6	7		8	9	(10		
3.	Handout 1	materi	als we	ere adeq	uate an	d perin	ient.							
	Excellen							•				<i>l'oor</i>		
	(10)	9	8	3 7	6		5	4	<i>3</i>		2	1		
/4.	Circle t	he nun	ıber tl	at repr	esents	your oi	verall	evai	luation	ı of	the	workshop	•	
,	poor			•		-					Ex	cellent:		
	1	2	3	4	5	6	7		8	9	(10)		
5.	Briefly	commen	it on t	the foll	owing:									
	a. What	chang	e(s) i	in the w	orkshop	would	have n	nade	it, mor	e be	ene s j	cial for		
\	1/0	,,2 P1	DORG 6	explain.		200	1011	מ זו	WW	ww	ייגוצא א	dien e		8
ンハ	`. /x	1114.	Mes	neres	- 0 NV	man	4. K	CC	ence	ر ''	CIL	11192	A K	ali
	b. In ye	our op	inion,	whatla	re the	major u	eakne	ses	of the	wo:	rksho	19? // U	hud	<u>ر</u>
	Ple	ease e	xplain	1.								07	c lle	,
					•							Lina	legen	dual
•					W. Carlo	5							10 11118	<i>i</i> .
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					<i>.</i> •		A M	tin		lri	me	uch of clas	estoo.	رررا.
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		-							
Nam	ne of Workshop	SI	P				Date	17.	4. 87
Wor	kshop Presente	or Dil	Mc	Duis	l	Loc	ation	A-7 M	Univer
1.	How well did the beginn	this work ing of the	shop suc worksho	ceed in p7 Circ	meetin le the	g the numbe	objecti r.	ves set	forth at
	Excellent								<i>l'oor</i>
	(10)	9 8	7	6	5	4	3	2	1
2.	Indicate the your work o	degree to issignment	which t	he conte	ent of	this w	orkshop		
	Poor							Exc	ellent
	1 2	3	4	5 6	5	7	8	9	(10)
3.	Handout mater	rials were	adequat	e and pe	rinent	•			
	Excellent			•			•		<i>Poor</i>
	(10)	9 8	7	6	5	4	<i>3</i>	2	1
4.	Circle the m	unber that	represe	nts your	overa	ll eva	luation	of the	workshop.
	poor							E	xcellent
	1 2	3	4	5 .6	;	7	8	9	10)
5.	Briefly comme	ent on the	followi	ng:					
	a. What char you? I	nge(s) in Please exp	the work lain.	shop woi	ild hav	e made	it more	e benef	icial for
		•				رم) م			
	b. In your o	pinion, w explain.	hat are	the majo	r weak	nesses	of the	workslı	op?

				_							- 1		
Nam	e of Works	shop_ <u>x</u>	lef C	ر —					_ Dat	e	1-0	74-81	
Wor	kshop Pres	entor	Dry	Saux	dra	mc.	Kiire	Loca	tion_	a	V9	18	
	;									Ca	rte	v Ha	
1.	How well	did t	his wor g of th	kshop s	succeed	in mee Sircle	ting the n	the c	bject	ives	set	forth a	t
	Excellent		y oj in	e worke	, iopi		• • • • • • • • • • • • • • • • • • • •					<i>l'oor</i>	
	10	9	8	7	6	. 5		4	3		2	1	
2.	Indicate your wo	the de	egree t signmen	o which t.	i the co	ontent	of th	is wo	rksho	p is			
	Poor										Exce	llent	
	1	2	3	4	5	6	7		8	9		10)	
7	Handout m	atoni.	11 a war	a adeau	ate mo	l nerin	ent.			`			
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5.	Briefly c												
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	b. In yo	ur opt	inion, 1	what ar	e the n	najor w	eakne	sses	of the	e wo	rksho	p?	
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			SUBJE	CT MAT	TER WO	RKSHO	P EVAL	UNTION	FORM		
	ne of Wor kshop Fr		5 r_D1	I P	unda	M ^e l	soure	D	ite	7/24	<u>/87</u>
1.	How wel	l did eginni	this wor	rkshop he work	виссееd shop?	in mee Circle	ting th	he objec mber.	Aives	set for	rth at
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	i. In y	your op Lease e	oinion, explain.	what a	re the i	najor w	eakness	es of t	the wor	·kshop?	

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	ne of Wor	·kshop_	_Lrw	ject_	168			Da	te	1/24	187	
Wor	kshop Pi	esento	r Dr.	Sau	ndra	Mc La	irr^{Lo}	cation	ali	<u>s.</u>	l+m	
1.	How well the b	l did i	this wor	kshop s e works	ucceed hop? C	in meet ircle t	ing the he numb	objec er.	tives	set so	rth at	
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2.	Indicat your	e the d work as	legree t ssignmen	o which t.	the co	ntent o	fthis	worksh	op is	releva	nt to	
	Poor									Excell	ent	
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3.	Handout	materi	lals wer	e adequ	ate and	perine	ıt.					
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	y	. h. l	ease ex	piain.	00	s wa	~ ~	~ ~ ~	ties			
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	b. In s	Uow your op	inion, s	racu	adad	10 20	real	of The	ヒソ	rela	lul -	
	b. In p	Uow jour op lease e	- wp inion, s xplain.	word	RSho e the mo	P wed	vaili knessei	of th	ne wor	relsi kshop?	ful-	2 .
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Nan	ne of Work	kshop_	Pro	gject	S	ρ				Date		Tul	413-24	
Wor	kshop Pre	esentor		-			ruice	L	ocati	.on_	<u> </u>	M	Lloiv	
1.	How well the be	l did t eginnin	this w	orkshop the wo	р виссе rkshopl	eed in 7 Cir	meeti cle th	ng th e nwn	e obj ber.	ecti	ves	set	t forth at	
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3.	Handout	materi	als we	ere ade	equate	and p	erinen	<i>t</i> .						
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5.	Briefly	commen	t on 1	the soi	lowing									
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	b. In yo	our op ease e	inion, xplair	what	are th	e maj	or wea	kness	es of	' the	woı	rksh	op?	
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e of Wor	kshop_	Pros	ect.	51P			Dat	e	1/24/87	> —
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	the num	ber tha	t repre	esents ,	your ove	erall et	valuation			
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Briefly	commen	t on the	e follo	owing:						
Leujoga Lut som b. In y	ou? Pl ed the e wer our op	ease exp works e not p inion, r	olain. Kop ag Krepare What ar	ratda L.	aL. Uo major we	st of eaknesse	the pre	seuters e works	were goo	ď,
	How well the be Excelled 10 Indicate your to Poor 1 Handout Excelled 10 Circle to poor 1 Briefly a. What you b. In your to the solution of the	How well did to the beginning Excellent 10 9 Indicate the conjunct work as Poor 1 2 Handout materia Excellent 10 9 Circle the numpoor 1 2 Briefly comment a. What chang you? Plant of the surface were b. In your op	How well did this wor the beginning of the Excellent 10 9 8 Indicate the degree to your work assignment Poor 1 2 3 Handout materials were Excellent 10 9 8 Circle the number that poor 1 2 3 Briefly comment on the a. What change(s) in you? Please expended the work of the total some were not plant to the your opinion, to the some were not plant to the work of the work of the work of the total some were not plant to the your opinion, to the the work of th	How well did this workshop the beginning of the work. Excellent 10 9 8 7 Indicate the degree to which your work assignment. Poor 1 2 3 4 Handout materials were adequent excellent 10 9 8 7 Circle the number that represent poor 1 2 3 4 Briefly comment on the follows. a. What change(s) in the work you? Please explain. Leujoyed the workshop agust of th	How well did this workshop succeeds the beginning of the workshop? Excellent 10 9 8 7 6 Indicate the degree to which the conjument. Poor 1 2 3 4 5 Handout materials were adequate and Excellent 10 9 8 7 6 Circle the number that represents poor 1 2 3 4 5 Briefly comment on the following: a. What change(s) in the workshop you? Please explain. Leujoyed the workshop agraf day and some were not prepared. b. In your opinion, what are the reserved.	How well did this workshop succeed in mee the beginning of the workshop? Circle Excellent (10) 9 8 7 6 5 Indicate the degree to which the content of your work assignment. Poor 1 2 3 4 5 6 Handout materials were adequate and perine Excellent (10) 9 8 7 6 5 Circle the number that represents your over poor 1 2 3 4 5 6 Briefly comment on the following: a. What change(s) in the workshop would be you? Please explain. Leujoyed the workshop agraf dad. How the following were not prepared. b. In your opinion, what are the major were not prepared.	How well did this workshop succeed in meeting the the beginning of the workshop? Circle the num. Excellent \[\begin{align*} 10 & 9 & 8 & 7 & 6 & 5 & 4 \end{align*} \] Indicate the degree to which the content of this your work assignment. Poor \begin{align*} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{align*} \] Handout materials were adequate and perinent. Excellent \begin{align*} 10 & 9 & 8 & 7 & 6 & 5 & 4 \end{align*} \] Circle the number that represents your overall end poor \begin{align*} 1 & 2 & 3 & 4 & 5 & 6 & 7 \end{align*} \] Briefly comment on the following: a. What change(s) in the workshop would have made you? Please explain. \text{Leujoyed the workshop agrat deal. Host of the following were not prepared.} b. In your opinion, what are the major weaknesses.	How well did this workshop succeed in meeting the object the beginning of the workshop? Circle the number. Excellent 10 9 8 7 6 5 4 3 Indicate the degree to which the content of this worksho your work assignment. Poor 1 2 3 4 5 6 7 8 Handout materials were adequate and perinent. Excellent 10 9 8 7 6 5 4 3 Circle the number that represents your overall evaluation poor 1 2 3 4 5 6 7 8 Briefly comment on the following: a. What change(s) in the workshop would have made it monyou? Please explain. Leyoyed the workshop agraface L. Most of the present some were not prepared. b. In your opinion, what are the major weaknesses of the	How well did this workshop succeed in meeting the objectives see the beginning of the workshop? Circle the number. Excellent (10) 9 8 7 6 5 4 3 2 Indicate the degree to which the content of this workshop is reyour work assignment. Poor 1 2 3 4 5 6 7 8 9 Handout materials were adequate and perinent. Excellent (10) 9 8 7 6 5 4 3 2 Circle the number that represents your overall evaluation of the poor 1 2 3 4 5 6 7 8 9 Briefly comment on the following: a. What change(s) in the workshop would have made it more bene you? Please explain. Leujoyed the workshop agrat dad L. Wost of the presenters but some were not prepared. b. In your opinion, what are the major weaknesses of the works.	How well did this workshop succeed in meeting the objectives set forth at the beginning of the workshop? Circle the number. Excellent 100 100 100 100 100 100 100 1

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Nan	ne of Woi	·kshop_	Seu	nee.	In	prives	ut.	Projec	<u>‡</u> Date	18/24	/87	
	rkshop Pi		\cap	S.						Holam		
HUI	Kenop 11 ;	60611001									•	
1.	How well	ll did t	this wor ig of th	kshop e e worke	succe shop?	ed in Circ	meeti :le tl	ng the se numbe	obje c ti er.	ves set	forth at	
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	Poor										llent	
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3.	Handout		ials wer	e adeqi	iate i	and pe	erinen	t.			Гоог	
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4.	Circle	the nun	ıber tha	t repre	esente	в уоиг	over	rall evo	aluation	of the	workshop.	
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5.	Briefly						V.	ery-	speci	ind h	man.	
	a. Wha	t chang ou? Pl	je(s) in Lease ex	the wo	rksh	ор шог	ıld ha	ve made	e it mor	e benefi	cial for	
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	b. In	your op lease e	oinion, i explain.	vhat ar	e the	e majo	r wea	knesses	s of the	worksho	p?	

Nam	e of Work		5c;	enc	e I	mProv	e m t	ntle	ject I	ate_	Ju	1y /	3-2	4,198
	kehop Fre		r <u>. D</u> y	<u>1, 5. </u>	Mç	Gui	re	Lo	catio	m <u>f</u>	1.7_	<u>///</u>		
1.	How well	did i	this wo	rkshop he work	succe shop?	ed in n Circl	eeti e tl	ng the e numb	obje	ctiv	es (set sc	orth at	
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3.	Handout	materi	ials we	re adeq	uate d	and per	riner	t.						
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4.	Circle t	he nu	nber th	at repr	esenti	your	ovei	all ev	aluat	ion	of t	the wo	rkshop.	•
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5.	Briefly	conmer	it on t	he foll	owing	:								
	a. What	chang u? Pi	ge(s) i Lease e	n the w xplain.	orksh	op woul	d ha	ve mad	le it	more	ber ber	iesici	lal for	
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	b. In y	our of ease e	oinion, explain	what a	re the	e major	wea	knesse	s of	the	wor	kshopi	,	
		h			•									

Nan	ne of Workshop Project SIP Date July 13-24
	kshop Presentor Sayndra Mc GuireLocation H+m Uni
4	How well did this workshop succeed in meeting the objectives set forth at
1.	the beginning of the workshop? Circle the number.
	Excellent Foor
2.	your work assignment.
	Poor Excellent
	1 2 3 4 5 6 (7) 8 9 10
3.	Handout materials were adequate and perinent.
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	10 9 8 7 6 5 4 3 2 1
4.	Circle the number that represents your overall evaluation of the workshop.
	poor
	1 2 3 4 5 6 7 8 / 9 10
5.	Briefly comment on the following:
	a. What change(s) in the workshop would have made it more beneficial for you? Please explain.
	Eledricity + Magnets was dufficult forme
	the driver the letter would
	b. In your opinion, what are the major weaknesses of the workshop?
	no real weaknesses like to have
71	have
	Evenymente was filled

Nan	e of Wor	kshon	Pn	-100	<i>t</i>	ST	P			Date_	1,	3-2	4-	Ju
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Wor	kshop Pr	esentor	· DA	1710	E d	ur	<u>e </u>	<i>L</i>	ocati	on	//			-
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2.	Indicate your u	the d	legree t signmer	o whic	h the	conte	nt of	this	work	shop				
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	Exceller	ıt			•				·				oor	
	(10) 9	8	7		6	5	4		<i>3</i>	2		1	
4.	Circle t	he num	ber tha	t repr	esents	your	over	all e	valua	tion	of th			
	poor						,					Excel	lent	
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	b. In u	our op	inion.	what a	re the	major	wea	knesse	es of	the	works	shop?		
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		•	SUBJ	ECT M	1ATTI	ER WO	RKSI	10P	E۷۸	LUA	TIO	N F	ORM					
Nan	ne of Work	shop	R	DLC	<i>t</i>	<u>S1</u>	P					Date		- I `	3 - 7/	12 11/3	7	
Wor	kshop Pre	sentor		Sam	<u>ad</u>	4	M'C	Ju	<u>~ė</u>	Loc	cati	on_	43	1				
1.	How well the be	did to	his w	orksh the w	op su orksh	cceed	in n Circl	neeti Le tl	ing he n	the umbe	<i>obj</i> er.	ecti	ves	set	forth	at		
	Excellen		9 0,					•							Foor			
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	b. In yo	our opt ease es	inion xplai	, what n.	t are	the i	najor	: wed	ikne	6868	oj ^r	the	wo.	เหรก	орг			
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ASH-UAH RECIONAL INSERVICE EDUCATION CENTER

INSERVICE ACTIVITY EVALUATION FORM

Na Va	ne of	Workslio	r <u>Pr</u> 7/2	0,00		JIP	Loca	Wo	orkshop 	Presentor_	Sandra- MErine-
1.						ucceed p? Cir				Jectives no	t forth at
	Exce	llent 9	8	7	6	5	4	3	2	toor 1	
2.		work os	niiglee	ent.		the co		of t		cehop In tel Excellent 10	evant to
3.	llando Excel					ite and				l'00 r I	•
4.	Circl Poor					sents yo			g g	tion of the Excellent 10	wot kshop.
5.	a. W	ly comm iat cha ou? l'Le	ունե (ե) in t	he wor	- 7	ould	liave	made It	more banef	letal for

b. In your opinion, what are the major weaknesses of the workshop? Please explain.

HUNTSVILLE CITY SCHOOLS Huntsville, Alabama

EVALUATION OF IN-SERVICE PROGRAM

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SUBJECT MATTER WORKSHOP EVALUATION FORM Name of Workshop Location Workshop Fresentor How well did this workshop succeed in meeting the objectives set forth at the beginning of the workshop? Circle the number. *l'oor* Excellent 1 Indicate the degree to which the content of this workshop is relevant to your work assignment. Excellent Poor 1 2 3. Handout materials were adequate and pertinent. Poor Excellent 1 Circle the number that represents your overall evaluation of the workshop. Excellent poor 1 2 5. Briefly comment on the following: What change(s) in the workshop would have made it more beneficial for you? Please explain. none.

In your opinion, what are the major weaknesses of the workshop?

none

Please explain.

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SUBJECT MATTER WORKSHOP EVALUATION FORM

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SUBJECT MATTER WORKSHOP EVALUATION FORM

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Na	ame of Workshop Project SIP vate 8-5-88
Wo	orkshop Presentor Dr. Saundra McGuire Location A & M Univ.
1.	. Now well did this workshop succeed in meeting the objectives set forth at the beginning of the workshop? Circle the number.
	Excellent Foor
	10 9 8 7 6 5 4 3 2 1
2.	Indicate the degree to which the content of this workshop is relevant to your work assignment.
	Foor
	1 2 3 4 5 6 7 8 9 10
3.	Handout materials were adequate and pertinent.
	Excellent
	10 9 8 7 6 5 4 3 2 1
4.	Circle the number that represents your overall evaluation of the workshop. Excellent
	1 2 3 4 5 6 7 8 9 10
5.	Briefly comment on the following:
	a. What change (0) in the workshop would have made it more beneficial for you? Please explain. Some of the guest presentors were "over our heads." Dr. McGuire is an excellent methods instructed.
• •	b. In your opinion, what are the major weaknesses of the workshop? Please explain.
•	We had trouble hearing the guest presentors. This, coupled with
	language and dialect differences, was a problem
Du	ierall, the workshop was the most helpful of any I have

ever participated in: It was a great refresher course as well as an excellent methods seminar. I am very thankful that I

had this opportunity and appreciate all the wonderful equipment!

Appendix 5
Project SIP Pre-Post Test Results

1986 Project SIP Pre and Post Test Scores

Teacher No	umber <u>I</u>	Pre-Test	Post Test	Difference
1		11	28	+17
2		24	29	+5
3		25	20	-5
4		32	35	+3
5		18	32	+14
5 6 7		17	22	+5
7		2 5	25	0
8		20	29	+9
9		22	24	+2
10		23	38	+15
11		· 22	25	+3
12		26	31	+5
13		23	32	+9
14		13	28	+15
15		15	26	+11
16		24	32	+8
17		19	25	+6
18		23	32	+9
19		25	34	+9
20		20	29	+9
21		26	33	+7
22		31	36	+5
23		16	39	+23
24		12	26	+14
25		25	37	+12
26		20	30	+10
27		16	33	+17
28		31	37	+6
29			35	
	Average scores:	21.57	30.25	+8.86

After a t-test for significance of differences between related scores to determine whether the cognitive gains were significant, the t value obtained was 7.74. This figure is significant at the 0.001 level of significance for 27 degrees of freedom. Hence, the odds that the cognitive gains were due to chance rather than the workshop are less than one in 1000.

Pre-Post Scores from 1987 Project SIP

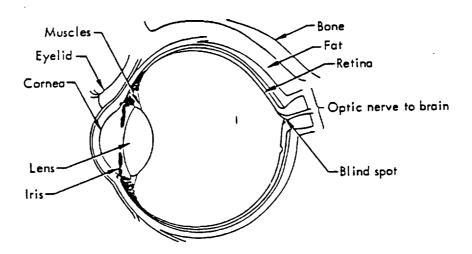
Teacher Number	Pre-Test	Post-Test	Change
1	19	26	+7
2 .	22	30	+8
3	19	28	+11
4	23	29	+6
5	17	28	+11
6	15	27	+12
7	12	23	+11
8	16	27	+11
9	14	22	+8
10	15	32	+17
11	13	23	+10
12	7	25	+18
13	28	37	+9
14	22	31	+9
15	19	31	+12
16	24	25	+1
17	11	24	+13
18	14	35	+21
19	15	19	+4
20	21	21	+0
21	13	26	+13
22	6	28	+22
Averages:	16.59	27.14	10.63

After a t-test for significance of differences between realted scores to determine whether the cognitive gains were significant, the t-value obtained was 6.15. This figure is significant at the 0.001 level of significance for 22 degrees of freedom. Hence, the odds that the cognitive gains were due to chance rather than the workshop are less than one in 1000.

Appendix 6

Representative Lessons Presented in Project SIP

39. Senses & Skills TEACHER'S GUIDE Page 3



Your eyes are incessantly making fine movements to focus objects on this sensitive spot. If you look at an object that is clearly in focus, all else in your field of vision is blurred. The image is transmitted to the brain by the optic nerve to be interpreted. Myopia or nearsightedness is a result of the eyeball being longer (front to back) than it is wide. Hyperopia or farsightedness is a result of the eyeball being shorter than it is wide. Astigmatism results if the cornea which covers the lens, or the lens itself, or both, are distorted.

The brain does much of our visual work. Our vision is stereoscopic. Two slightly different images are transmitted to the brain, fused, and interpreted so that the result we see is objects that stand out from the background. We do not get this sense of depth when we look at a photograph because both eyes see the same image. Our judgment of the size of an object depends upon the size of the image produced and also its distance from our eyes. For instance, a church steeple a mile away looks no bigger than a needle a foot away. But the brain takes into account the different distances and concludes that the steeple is bigger.

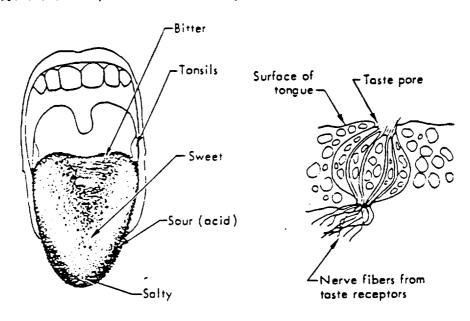
The brain can be deceived by optical illusions with which we are all familiar. Optical illusions are created by imitating certain effects upon which the brain bases its judgment of size, shape, and color of objects.



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gaseous must be carried by eddies from lower air currents upward to the top passage, which contains the receptors for smell. To get a better smell we purposely take short breaths or whiffs to increase the number and force of the upward currents.

The sense of taste is stimulated only by dissolved substances. The organs of taste, called taste ouds, are located chiefly on the upper surface of the tongue. The



cells that make up the taste buds are supplied with fine branches of the taste nerves. There are five fundamental sensations of taste — sweet, bitter, sour, alkaline, and salty (although bitter and alkaline seem the same). Other tastes are a combination of these or a combination of taste with other sensations. Pepper produces a burning sensation, oils are often unpleasant because of how they feel, soda water "nips" the tongue, etc. Some tastes are combined with smell through the communication that exists between the mouth and the back of the nose. Note how different everything tastes when you have a cold. The fundamental taste sensations are not felt equally over all regions of the tongue, but are concentrated as follows:

Sweet - tip and front

Salt - tip

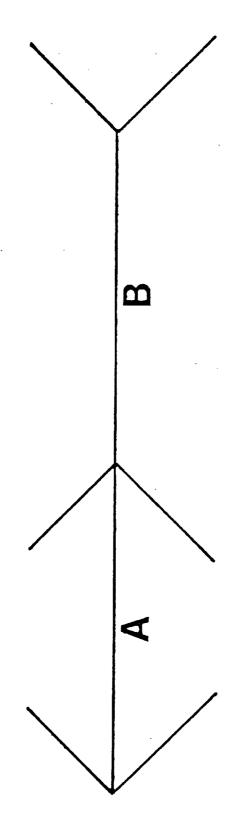
Sour - sides

Bitter - back

The central part of the tongue is not very sensitive to taste.

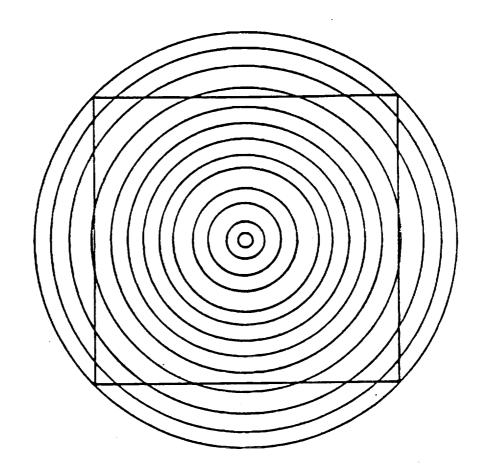


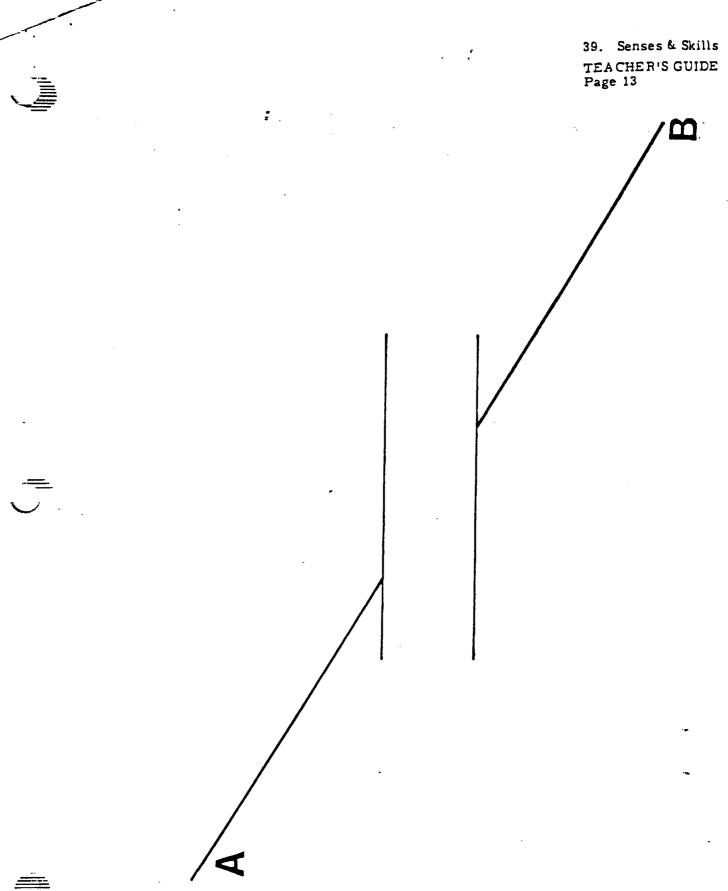
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Show the students each of the optical illusions. Ask them to tell you what they see. After all the illusions have been shown, go back and discuss each one briefly, pointing out where the brain was led astray.

Set the illusions up where the students can see them. Allow them to reconstruct the lines for themselves, either on paper or on the blackboard. It would be fun for them to take home some of the optical illusions they make to show their families or friends.

Allow each student two pieces of construction paper of each color. Have them draw a circle 5 inches in diameter on one white and one black sheet of paper using the two pencils, the piece of string, and the ruler. Then tell them to cut out the circles, and paste the white circle in the center of the black paper and the black circle in the center of the white paper. Ask them to tell you what they see; explain that the white circle looks larger because of the spreading effect of the bright light on the retina.

Vocabulary

optical illusion retina

Taste Experiments

Materials

Quart bottles of salty water, quinine water (bitter), diluted vinegar (acid), and sugar solution (sweet), labeled A, B, C, and D, respectively.

Small vials.

Swabs (Q-Tips, for example).

The four solutions represent the fundamental tastes. All other tastes are due to varying concentrations and combinations of these four tastes. Also, different parts of the tongue are sensitive to different tastes. The tip of the tongue is sensitive to sweet tastes, the sides to sour, the back to bitter. The salt-sensitive taste buds are more uniformly distributed, with some being strongly concentrated on the front edge. There seem to be different taste buds for each of these tastes.

Give each student a small vial containing one of the solutions. The contents are unknown to the students, but label each vial A, B, C, or D so that its contents can be identified later. Have each student dip a Q-Tip applicator in his solution and taste it only on the tip of the tongue. Then ask what was tasted and have the students write the results in their Worksheets. Some children will not be able to taste anything, so have these students redip and taste on the sides, back, or middle of the tongue to find the



fingers. So feeling an object with the opposite sides of the fingers gives one the impression of feeling two objects.

Experiment 3

All objects brought by students are placed in a sack (or a clean sock). Each student tries to pick, by touch alone, the object he brought. Then each student tries to identify other objects. The bags are exchanged between tables and then each student will try to identify one or two objects.

Our sense of touch can be trained and used to distinguish many objects that are of the same size but have different shapes or textures. Our sense of touch can be trained to "see."

Vocabulary

information sensitive
message stimulate
nerve ending stimulus, stimuli

. Maze Experiments

Materials

Blindfold

Bar of strong-smelling soap or some strong perfume

These experiments are games in which individual students try to negotiate simple mazes by relying on specific senses or combinations of senses.

The student selected as "it" leaves the room while the rest of the class, under the teacher's direction, forms a simple maze, holding hands to make the maze walls. The student who is "it" is then positioned at the start of the maze, and he tries to walk through the maze as quickly as he can under one of the conditions specified below. When he is finished, a new student is selected to be "it," a new maze is formed, and a new condition is imposed. Time each run.

The conditions:

- 1. All senses available and operating.
- 2. Blindfolded; hands behind back (no sight, touch, or hearing).
- 3. Blindfolded; hands used freely (touch emphasized).
- 4. Blindfolded; guiding sounds made by students (hearing emphasized).
- 5. Blindfolded; bar of scented soap at goal (smell emphasized).



Name	Date	39. Senses & Skills
		WORKSHEETS
		Page ?

TASTE EXPERIMENTS

_	Part of tongue			
	Tip	Sides	Back	Middle
Solution A				
Solution B				
Solution C				
Solution D				

1.	Sweet taste was in Bottle
2.	Sour taste was in Bottle
3.	Bitter taste was in Bottle
4.	Salty taste was in Bottle
Fil	l in the blanks with <u>sweet</u> , <u>sour</u> , <u>bitter</u> , or <u>salt</u> :
5.	The tip of your tongue is good for tasting
6.	The back of your tongue is good for tasting
7.	The sides of your tongue are good for tasting
8.	The taste you liked the most was
9.	The taste you disliked the most was



Name	me	Date	
_			

39. Senses & Skills WORKSHEETS Page 4

MAZE EXPERIMENTS

<u> </u>	ises oberating.	Time to reach goal	
1.	All senses		
2.	No senses		
3.	Touch only		
4.	Hearing only		
5.	Smell only		
	Name the five	enses in the order that they are most used, based on the resu	lts
oſ	the maze game.		
1.			
2.			
3.			
4			



Lesson 10

Heat II: Thermal Expansion

Most materials expand (get bigger) when they are heated and contract (get smaller) when they are cooled. If we consider what happens to the molecules in a material when it is heated or cooled we can visualize what causes expansion or contraction. As heat is added to a material, its molecules start moving faster (vibrating in the case of a solid or moving randomly in the case of a gas or liquid), bumping into neighboring atoms and knocking them away. Thus, the average distance between the molecules increases and the material expands.

This might be easier to visualize if we consider the analogy of a row of people sitting next to each other on a long bench. If everyone is sitting still and as close together as is comfortable, let us assume that the occupied length of the bench is, say, 20 feet. But if we ask each person to sway in place from side to side (but not in time with his neighbors) and then ask the row of constantly swaying people to arrange themselves as close together as is comfortable, we would find a much longer portion of the bench is used: perhaps 25 or 30 ft. This "expansion" of the row of people is very much like the expansion that takes place in a heated wire.

Experiment 1. Solid Expansion

When the molecules in a solid vibrate more rapidly as temperature increases, the distance between them increases and the space they occupy expands. This expansion is easily seen by the expansion of a strand of copper wire when it is heated.

Materials

Copper wire
3 inches of 1/8 in. diameter solid solder wire
Meter stick
Disposable butane lighter
Clamp

Procedure

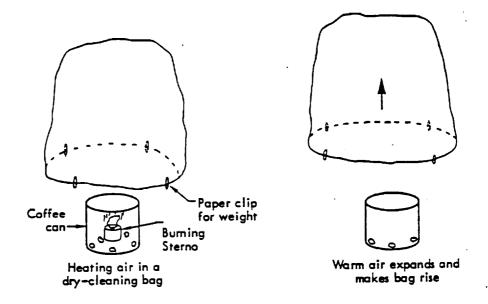
Fasten the solder wire to one end of the copper wire, and clamp the other end so that the wire hangs vertically. Hold the meter stick vertically next to the weight, with one end firmly on the floor. Have several students read the position of the bottom of the weight to the nearest millimeter. Then heat the length of copper wire with the flame of the lighter. Notice that the copper wire gets longer. Have several students watch the reading on the meter stick change while you heat the wire.

Materials

Dry-cleaning bag (plastic)
Paper clips
Coffee can
Can of Sterno

Procedure

First, remember to use caution so as not to ignite the plastic bag. Remove the top of the coffee can and punch about five holes around the side of the can as near to the bottom as possible. Center the Sterno in the bottom of the coffee can, and set the can on the floor, and light the Sterno. Place four paper clips evenly spaced around the open end of the dry-cleaning bag and hold the bag, open end down, over the coffee can so that it fills with hot air. (To do this requires a little practice.) The bag will fill with hot air and float away. As the air inside the bag cools, it will settle back down to the floor.



The bag floats when the air inside is heated, because the air expands when heated, and, therefore, less air is required to fill the bag when the air is hot than when it is cold. That is, a given volume of hot air has fewer molecules and weighs less than the same volume of cool air.

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Lesson 24 Molecules

PURPOSE

ats with the basic properties of molecules and how molecules

MATERIALS

/der, or steel wool.
.ble from a drug store or a nursery).
agnet will do).

mic dish or test tube (do not use plastic).

nane torch, or stove.

ol, fine wire, or powder, the finer the better.

opper and the balance, are for Experiment 2, if time and

SAFETY

experiments presented in this lesson. Be sure that torches, ig else that's hot, are handled in a safe place with good is a fire extinguisher in the room.

Ortant to do the iron-and-sulfur experiment with good ventilansmell bad. If you can stand the smell, the room is safely

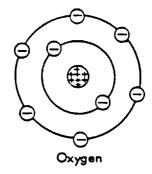
BACKGROUND

? A molecule is a stable combination of two or more atoms.

son 8 that atoms are the basic building blocks of nature; each
s with one or more electrons orbiting around it.

rm? In general, molecules form because the atoms have less
molecule than they do as separate atoms. For example,
sines with an oxygen (O) atom to form a carbon monoxide

24. Molecules
TEACHER'S GUIDE
Page 3



let us look at a simpler
t. The "molecules" that we
n idea of how the real

V	VI
Y	Q
E	x
I	Z
υ	

words. Not all combinakewise, with real elements, nolecules. In general, other in the periodic chart seen in our alphabet form two-letter words ave similar properties to be formed from these two

les with other elements of that no combination of T,

Columns III, IV, and V?

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In the real world, it is possible to construct molecules with many thousands of atoms. Of course, in these large molecules there are a very large number of atoms of a relatively few elements.

DEMONSTRATIONS

You have some disks with bumps and some with slots. The ones with bumps are labelled H and Na, and the ones with slots are labeled O and F. These disks are models of simple atoms, like the "friends" and "enemies" pictured above.

Try fitting the disks together to form compounds. What compounds can you form? What compounds will not form?

Answer: H2O, Na2O, HF, and NaF will form; HNa, and OF will not.

Experiment 1

Materials

Matches

Pyrex or ceramic dish or test tube.

Iron powder (Fe) or steel wool.

Sulfur powder (available at drug store or nursery).

Magnet.

Procedure

- 1. Feel and smell the iron powder and sulfur. Test each material's response to to the magnet.
 - 2. Mix the iron and sulfur together (about 2 to 5 cubic centimeters of each).
- 3. Use the magnet to separate some of the iron out of the mixture. Note that neither the iron nor the sulfur has been changed by the mixing or by the separating.
- 4. Take a small amount of the mixture (a few cubic centimeters, or a heaping teaspoon) and put it in a ceramic dish or test tube. Light this small sample of the mixture with a match, or heat it in a test tube over a stove.

NOTE: Step 4 should be done outdoors or in a well-ventilated area.

- 5. After the material stops "burning," let it cool down.
- 6. Test the new material's response to the magnet.

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Further Exercise for Interested Students

Subtract the weight of the dish from the weight of the dish plus the copper before heating. This tells you how much copper you had.

Subtract the weight of the dish and the copper before heating from the weight of the dish and its contents after heating.

How much did the weight change?

This tells you how much oxygen combined with the copper. Look up the atomic weights of copper and oxygen on your periodic chart. Divide one by the other (find the weight ratio). How does this compare with the weight ratio of the amount of copper and the amount of oxygen used in your experiment?

This shows you that about one atom of oxygen combines with one atom of copper to form copper oxide.

Experiment 1 (iron and sulfur) will be more interesting also if everything is weighed before and after.

These experiments both will show that you can "burn" something — that is, you can produce a chemical reaction — and not lose much material; or, in fact, you can even gain some.

When you burn a piece of wood or paper, almost everything goes away. That is because the new compounds you make are steam (H_2O) and carbon dioxide (CO_2) , which are both gases and which both mix with the air and disappear unless you take special trouble to catch them (as we did to catch the water made by heating sugar in Lesson 8).

Appendix 7

Project SIP Certificate of Achievement



THE ALABAMA A&M UNIVERSITY DEPARTMENT OF CHEMISTRY

THE A&M-UAH REGIONAL INSERVICE EDUCATION CENTER

present this

SIP Program

Certificate of Achievement

2

in recognition of successful completion of the 40 hour Science Improvement Project workshop

Presented this _

day of

SIP Program Director

Huntsville, Alabama

annie M. Wella Regional Inservice Education Center Director

Appendix 8

Abstract and Paper Presented at National NOBCChE Meeting

Abstract of Technical Presentation

Submitted for

The 14th Annual NOBCChE National Conference April 13 - 18, 1987 Hotel Meridien, San Francisco, CA

Submitted by

Saundra Yancy McGuire Department of Chemistry Alabama A & M University Normal, AL 35762

The Alabama A & M Science Improvement Project:
Getting Minority Students Involved in Science!

In view of the rapidly dwindling number of minority students enrolling in high school science and technology classes and the attendant decrease in minority students graduating with technical degrees from colleges and universities, there is an urgent need for Black scientists and educators to devise methods to reverse these The Science Improvement Program (Project SIP), based on the Lawrence Livermore National Laboratory Elementary Science Study of Nature (Project LESSON) is coordinated by the Department of Chemistry at Alabama A & M University. The program assists teachers in school systems with a significant minority student population to bring science alive in their classrooms. Teachers are taught science principles and a variety of hands-on activities that are easy for elementary and middle school students to perform, but still demonstrate basic scientific principles. Evaluation efforts have demonstrated that the teachers use the materials effectively in the classrooom and students become excited about science. This presentation will provide information on Project SIP as well as information on how scientists and educators in other locations can work together to improve the science education available to pre-high school youngsters, thereby increasing the number of minority students possessing the motivation and aptitude to pursue a technological career.



... Friday≈: 9:00-12:00: COLOMBARD

Jones and Young (continued)

It is hoped that this presentation will elicit a greater response from the black constituents of the ACS and help provide constructive engagement between black chemists and chemical engineers and their white majority cohorts.

THE ALABAMA A&M SCIENCE IMPROVEMENT PROJECT (SIP): GETTING MINORITY STUDENTS INVOLVED IN SCIENCE

S. Y. McGuire, Department of Chemistry, Alabama A&M University, Normal, Alabama

In view of the rapidly dwindling number of minority students enrolling in high school science and technology classes and the attendant decrease in minority students graduating with technical degrees from colleges and universities, there is an urgent need for black scientists and educators to devise methods to reverse these trends. One such method is the Science Improvement Program (Project SIP), based on the Lawrence Livermore National Laboratory Elementary Science Study of Nature (Project LESSON). It is coordinated by the Department of Chemistry at Alabama A&M University.

Project SIP assists teachers in school systems with a significant minority student population to bring science alive in their classrooms. Teachers are taught science principles and a variety of hands-on activities that demonstrate basic scientific principles and are easy for elementary and middle school students to perform. Evaluation efforts have demonstrated that the teachers use the materials effectively in the classroom and students become excited about science.

This presentation will provide information on Project SIP as well as information on how scientists and educators in other locations can work together to improve the science education available to pre-high school youngsters. Hopefully, this information will result in other methods being devised to increase the number of minority students possessing the motivation and aptitude to pursue a technological career.

The Alabama A & M Science Improvement Project: Getting Minority Students Involved in Science!

A paper presented at

The 14th Annual NOBCChE National Conference
April 17, 1987

Hotel Meredien, San Francisco, CA

bу

Saundra Yancy McGuire

Department of Chemistry

Alabama A & M University

Normal, AL 35762

Introduction and Statement of the Problem

Far too many students leave the Nation's elementary and middle schools with an inadequate foundation in mathematics and science(1). This lack of preparation translates directly into a deficiency in science and mathematics when these students emerge from high school. The problem of inadequate science and mathematics preparation is particularly acute for minority and disadvantaged members of the population who are located in large urban school systems. In 1980 only 28% of black high school seniors had taken a year of chemistry, as compared to 37% of white high school seniors.

Whereas a number of intervention programs exist that are designed to increase interest and proficiency in science for students at the high school level and beyond, few programs targeted at elementary and middle school teachers and students currently exist. However, in a November 1983 report published by the Rockefeller Foundation (2), Sue Berryman points out that the primary determinant of a desire or lack of desire for pursuing a scientific career for some students is their pre-high school interests. The pre-high school interests of some groups of students trigger an education sequence that will ultimately result in the group's underrepresentation among science and mathematics related doctorates.

In a September 1983 report to the National Science Board, the National Science Commission on Precollege Education in Mathematics, Science and Technology indicated that early and substantial exposure to mathematical and scientific concepts and processes is critical to later achievement (1). The Commission recommended that top priority be placed

on increasing effective science and mathematics instruction at the elementary level and on retraining present teachers and recruiting and retaining new teachers in order to insure that elementary and secondary science and mathematics teachers will be of high quality.

The problems addressed by this presentation are the lack of preparation of elementary and middle school science teachers in the basic sciences and the paucity of science materials that are available for use by these teachers. These problems lead to inadequate pre-high school science education and a subsequent decline in the number of the Nation's youth, especially minorities and females, who are prepared to pursue a technological career.

Approach to the Problem

A successful approach to improving science education at the high school and university levels has been the involvement of instructors in research activities with practicing scientists (3). The enthusiasm generated during the research project is carried back to the teachers' classrooms and they are able to make their subject matter more alive and interesting for all students in their classes. This approach is particularly cost effective because one classroom teacher may interact with 150 students during the course of a year. Student research programs, as effective as they are in motivating individual students, can never reach as many students as can programs aimed at teachers. Furthemore, it is somewhat counterproductive to send a student who has been successfully motivated by a summer research experience back to a

classroom in which the teacher is unprepared to continue the types of experiences which can make science an exciting discipline. participation of a classroom teacher in the NASA astronaut program demonstrates the importance of involving classroom teachers in the scientific process. One of the ten finalists in the NASA teacher astronaut program was assigned to the Marshall Space Flight Center (MSFC) for a one year period and interacted with some of the teachers participating in this project. Whereas elementary and middle school science teachers do not have the background to perform scientific research, they can certainly benefit from a project that allows them to perform science activities in the presence of scientists who will serve as valuable resource persons for them and their students. However, few programs for pre-high school science teachers currently exist. Project SIP provided an opportunity for elementary and middle school teachers to interact with scientists and become as excited about science as their high school counterparts do as a result of similar experiences.

The Elementary and Middle School Science Improvement Program
(Project SIP) represents an effective coalition between scientists and pre-high school educators to improve the elementary science curriculum. Project SIP involves an in-service workshop for teachers to provide instruction and materials for hands-on activities in the areas of biology, chemistry, physics, and electricity and magnetism. The Project SIP materials include approximately \$400.00 worth of science equipment for use in the teachers' classrooms and a lesson plan manual that provides background information in the science areas covered as well as detailed information on how to use the materials provided for hands-on

activities in the classroom. Additionally, the manual contains suggestions for home experiments that the students can perform. The Project SIP concept and materials were created by scientists at the Lawrence Livermore National Laboratory in Livermore, California. The project, called LESSON by the Livermore Scientists, has been successfully operating in California since the early 1970's and has been introduced in a number of other states in the country. The workshop has been conducted for teachers in Alabama for the past three years with funding provided by the Lawrence Livermore National Laboratory for the first two years and by the National Aeronautics and Space Adminstration for the third year. It is anticipated that the Project will continue for the next two years with NASA funding.

GOALS

The goals of Project SIP are:

- To increase the amount of hands-on experiences provided to science students in North Alabama elementary and middle schools,
- 2. To increase the interaction between North Alabama scientists and pre-high school science teachers, and
- To increase the number of minority and female students who actively engage in science activities in the pre-high school classroom.

<u>Objectives</u>

The specific objectives of Project SIP are:

To conduct a two-week workshop for thirty North Alabama teachers
of elementary and middle school science,

- 2. To involve at least fifteen different area scientists in presenting information to teachers and in performing science activities with them,
- 3. To provide a mechanism whereby the NASA teacher astronaut assigned to the Marshall Space Flight could interact with North Alabama elementary and middle school students and teachers in formal and informal settings,
- 3. To increase by a minimum of 50% the number of science activities that are demonstrated and performed in the classrooms of participating teachers, and
- To increase by a minimum of 50% the cognitive skills in science of participating teachers as determined by prepost-testing, and
- 5. To increase the number of minority and female students who are interested in science as a possible career.

Activities

The activities conducted to accomplish the objectives stated above are described below.

A two-week workshop for thirty teachers from North Alabama was conducted on the campus of Alabama A & M University during the weeks of June 16 - 27, 1986. The workshop involved forty hours of instruction in the basic concepts of biology, chemistry, physics, and electricity and magnetism. Personnel from the Marshall Space Flight Center were involved in the planning and implementation of the workshop, and a representative from the Johnson Environmental and Energy Center also

participated in the workshop activities. The teacher participants were selected on the basis of recommendations from principals and on self-referral. The workshop was coordinated by Dr. Saundra Y. McGuire, assistant professor of chemistry at Alabama A & M University. The workshop presenters included professors from the science departments at Alabama A & M University as well as scientists from the the North Alabama scientific community.

Since one of the ten finalists for the NASA teacher astronaut program was assigned to the MFSC for a one year period, she worked with the project to serve as a role model for local teachers as well as for students. However, due to the Challenger tragedy she was in such great demand as a speaker that she was only able to visit two schools. However, her visists to the schools was inspiring to the students as well as to the teachers.

In addition to the two week workshop, follow-up visits were conducted at some of the schools of participating teachers during the 1986-87 academic year to assist with science instruction and to provide scientists as role models for the students.

Teachers evaluated the effectiveness of the Project SIP materials in their classrooms and suggested some modifications for improvement of the program. Teachers were encouraged to share the information and materials with other teachers in their respective schools. One of the requirements for participation in the project was a willingness to share the philosophy and activities of the Project with other teachers at a participant's school.

To date the Project SIP philosophy and materials have been

presented to approximately 90 North Alabama teachers. The teachers continue to indicate that receiving the materials and the instruction in basic science concepts has transformed their classrooms into places where science is an exciting subject to study.

FUTURE ACTIVITIES

Now that the materials have been disseminated to a number of classrooms in North Alabama, it will be possible to do research to determine whether the materials are really making a difference in the test scores and science attitudes of the students. These types of research activities will be conducted in the near future. However, for the present the project has succeeded in turning science from (as one teacher put it) "the stepchild of the curriculum to the belle of the ball.

HOW OTHER SCIENTISTS CAN HELP

Although Project SIP is presented at considerable effort and significant cost, variations of these activities can be conducted by virtually any scientist who is interested in the improvement of pre-college education. Some activities that individuals or groups of scientists can perform are:

 Visit pre-college classrooms to share information with students about science and scientists.

- 2. Become visible role models for students who have never had a chance to interact with a minority scientist.
- Provide resources and ideas to local schools that seek assistance.
- Encourage community groups of which you may be a part to present programs and discussions on science and the Black community.

If the activities suggested above are not performed, and scientists continue to ignore the condition of pre-college science, there will be no significant number of new scientists to replace those who are currently doing science. The technology needs of this Nation will require that all of our resources are developed to their full potential.

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 National Laboratory, February, 1985.

Appendix 9

Abstract from NASA-HBCU Forum 87

ALABAMA A&M UNIVERSITY

PRINCIPAL INVESTIGATOR: Dr. Saundra Y. McGuire
TECHNICAL MONITOR: Mr. James Rice (MSFC)

Elementary and Middle School Science Improvement Project -Second Year Activities in North Alabama

ABSTRACT

The Alabama A&M University Elementary and Middle School Science Improvement Project (Project SIP) completed its second summer workshop in July, 1987. Twenty-four teachers participated in the two-week workshop which included instruction in basic concepts of biology, chemistry, physics, and electricity and magnetism. The second year of the Project witnessed increased involvement by scientists at NASA's Marshall Space Flight Center. One of the primary objectives of the Project is the increased interest in science of elementary and middle school students so as to increase the number of students interested in pursuing quantitative careers. Because the capability to study science is primarily determined by the science background obtained in the pre-high school years, getting young students excited about science is crucial to increasing the scientific manpower outlook in the country. Particular emphasis in Project SIP is placed on interesting minority and female students in science.

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Appendix 10

Project SIP Materials List

Froject SIF Materials List

The following materials are needed for the kits in the areas of biology, chemistry, physics, and electricity and magnetism.

Biology

Milk carton, half-pint Candies, hard Gelatin, quick set Food Coloring, red Glove, latex surgical Bottle, 2 liter plastic Blue dextran, 1 vial Dried beans and peas, 12 Diffusion bag strip, 1 foot Cotton swabs, 6 Marbles, 4 Blindfold Construction paper, white & black Ice cream container, 1 pint Methyl cellulose concentrate, 1 vial Index cards, 3 x 5 Brown box with top, 3 X 8 X 2 Funnel, plastic Filter paper Brine shrimp eggs, 1 vial

Rubber bands, #16 Screw with nut Tongue depressors, 12 Rubber stopper with hole, #3 Y tube, 1/4" Tubing, soft gum, 6" Test tubes, 2 large plastic Tubing, flexible tygon, 10" Tubing, plastic, 2 pieces, 6" & 2" Vials, 6 small Toothpicks, flat and round Safety pin Perfume, 1 vial Vials, shell Vials, 2 plastic Paper cups, bathroom String, 2 feet Washers, 2 small Vials, plastic Petri dish, plastic Straw, 1 bag

Physics

Brick Erasers, 2 pink Lumber, 6" piece of 2 X 4 Marbles, 10 small, 5 large Meter stick Milk cartons, half gallon, quart Matches Bell wire, 12" no. 16 or 18 gauge Alcohol, rubbing Detergent, liquid Capillary tubes, long, thin, plastic Food coloring Candle Aluminum foil Aluminized mylar / Balloons Evaporating dish Beaker tongs Copper wire Flash light Ice cream box, empty Medical x-ray film Slide-cassette set on Our Universe Rope 20 feet Twine, 10 ft Prism Waxed paper

Sandwich bag, plastic zip lock Rope, 8 feet Tape measure Nails, 5 Rubber bands, 10 Ruler, flexible Pencil, 6 sided Paper clips, 10 Metal washers, 4 thick Scissors Screw eyes, 2 String, 6 feet Scotch tape Straw Wire screen, 1" X 1" Thread Thermometer Rods, plastic, rubber, metal Silk, 1 sq. ft. Wool, 1 sq. ft Fing pong balls Wire, bare #28 & # 14, bare Rubber Stopper, 1 hole Tape Solid solder wire, 3" of 1/8" diam. Slinky Tuning Fork, A

Electricity and Magnetism

Batteries, 6 volt, 2
Clip leads, 6
Bulbs, 2 six volt (GE 40)
Light bulb sockets, 2
Four dble pole, dble throw switches
Compass
Diodes, 2
Microphone, carbon
Earphone, with jack
Lamp cord, 9 meters, #18 or # 20
File cards, 1 pack of 20 4 X 6

Resistor, one 30 ohm
Magnet, horshoe & keeper
Wire, enamel covered
Rod, small iron
Microampere meter, (0 - 100 microamps)
Motor kit
Power supply, 6 volt ac
Magnet wire, No. 26-30 gauge
solid enameled copper

.

Chemistry

Blackboard erasers, 2 Chalk Iron Filings Magnet, bar Matches, 1 box Copper filings, fine Marbles, 20 Mothballs Medicine droppers, 10 glass Funnel, plastic with small bore Balloons, 5 Beakers, 4 pyrex, assorted sizes Ink, liquid, small vial Aluminum Foil Coat hanger Kleenex, small box Alum Glue, white File cards Candle, small Butane lighter, disposable Flashlight, small Copper sulfate crystals Filter paper Litmus paper, red, blue, neutral Measuring spoons Lemon juice Diet coke Alka Seltzer Bromothymol blue indicator Ammonia Lime water Milk of magnesia Baking soda Hydrochloric acid Ex Lax tablets Corks, 3 Charcoal briquet Mirrors, 2 small Dirt Bleach Charcoal, fine powdered

Test tubes, large pyrex, 2 Test tubes, small pyrex, 6 Test tube holder, wooden Sterno, large can Flay doh, case of 4 cans Wood, small blocks of walnut & balsa Pinch clamps, 2 Oven cooking bags, 2 Plastic cups, clear Nail polish remover, 1 bottle Toothpicks, flat Thread Plastic bag, dry cleaning Paper clips, 1 box Tape, scotch Silver mitrate solution Sodium chloride Water, distilled Spatula, small Test tube clamp Vinegar Sugar Soap Powder Spoons, plastic Rolaids Rubber tubing, 1 foot Root beer syrup Straws, plastic Sand Perfume

Science Materials from Common Materials

Item Use

Olive Jars Graduated Cylinder (calibrate

using a measuring cup and

magic marker)

Can of Sterno Heating Oil Bunsen Burner

Red Cabbage Leaf Juice Acid Base Indicator

(pink in acid; green in base)

Ex-Lax Tablets Phenolphthalein

Magnetic Can Opener Bar Magnet

Medicine Droppers Pipettes

Salad Dressing Bottle Flask

Shoe Box with Flashlight fixed inside Star Box

(One end has been removed to fit a cardboard with holes punched in the shape of constellations

Drinking Straw with holes and end clipped and flattened WInd Instrument

Very small cocktail straws Capillary tubes

Clear glass marble microscope

Cardboard tubes (toilet tissue, paper towel, etc)

Sound instruments (sound is

made by blowing over the tope of different sized tubes)

Muriatic acid (used to clean swimming pools)

Hydrochloric acid

Vinegar, lemon juice Common household acids

Ammonia, Milk of Magnesia, Antacids

Common household bases

Small condiment containers (for ketchup, mustard, etc)

Cups for Balances

Appendix 11
Workshop and Classroom Scenes

